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ABSTRACT

This competency based drafting curriculum is presented in seven specialization sections with units in each section containing a competency statement, performance objective, learning activities, evaluation, and quiz or problem sheets. Some units also contain answer sheets and/or handout sheets. Sections and number of units presented are (1) basic drafting--19 units; (2) technical illustration--13 units; (3) architectural drafting--13 units; (4) piping--4 units; (5) electric drafting--10 units; (6) jigs and fixtures--6 units; and (7) heating and air conditioning--7 units. Illustrations are provided throughout the guide. (BL)

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ED146349

DRAFTING

COMPETENCY BASED CURRICULUM

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This curriculum was developed through the cooperation and funds of the Bureau of Vocational, Technical and Adult Education, Department of Education, Charleston, West Virginia.

August 1977

CE 012 581

PREFACE

It is with the greatest pleasure that we bring you another West Virginia competency based education (CBE) curriculum. The Drafting curriculum was field-tested and revised by Albert Everly, John Riddle, Nolan Browning, Howard Racey and Al Ashcraft. This was developed and based on the Boone County Drafting curriculum. The effort was coordinated by Jim Rosebrook and Fred Harrington of the state staff.

The Bureau of Vocational, Technical and Adult Education, State Department of Education, began advocating CBE curriculum in 1974. Since that time we have produced state CBE curricula in a number of additional occupational areas. We also have a number of CBE curricula currently in the process of being developed and/or field-tested.

This Drafting curriculum was disseminated to West Virginia Drafting teachers at the Annual Vocational Education Conference in August of 1977 at West Virginia University. Additional copies of this curriculum are available at the Vocational Curriculum Laboratory, Cedar Lakes Conference Center, Ripley, West Virginia, 25271.

I trust this Drafting curriculum will help your program. Any suggestions you may have for improving this curriculum may be sent to the curriculum lab. Through this and other feedback we plan to continually update our curriculum.

Clarence Burdette
Assistant State Superintendent of Schools
Bureau of Vocational, Technical
and Adult Education

INTRODUCTION

This Competency Based Drafting Curriculum was developed and refined by Albert Everly, Monongalia County Drafting Instructor, John Riddle, Arch Moore Drafting Instructor, Nolan Browning, Wyoming County Drafting Instructor, Howard Racey, Greenbrier County Drafting Instructor, and Al Ashcraft, Vocational Rehabilitation Center Drafting Instructor.

This curriculum was originally developed by Dennis Jordan, Drafting Instructor at Boone County Vo-Tech Center in Danville, West Virginia. RCA Educational Service Corporation directed the original identification and validation of the Drafting competencies.

During the 1976-77 school year, this curriculum was field-tested in Monongalia County by Albert Everly, Jackson County by John Riddle, Wyoming County by Nolan Browning and Greenbrier County by Howard Racey. These teachers met periodically during the 1976-77 school year and revised the curriculum.

ACKNOWLEDGEMENTS

The project staff is indebted to many persons for their contributions to this project. Without their willing assistance, this curriculum could never have been completed.

We are particularly appreciative of the drafting teachers who developed the material and field tested it in their own drafting rooms. These teachers have brought the theories of CBE curriculum to life and made them work. These same teachers have shown that high school and post graduate students can learn the many competencies of the drafting profession when the practical applications are provided.

We wish to thank the hundreds of students who participated in the field tests. Not only did these students have to learn new classroom procedures and new areas of content, but did so using learning packets that were still in the developmental stage.

A special thanks must go to Dennis Jordan, drafting instructor, Boone County, who originally started this project and who laid the ground work for our final product.

Distribution and reproduction of curriculum materials was by the Vocational Curriculum Laboratory at Cedar Lakes. Larry Froelich, Director, was most cooperative in helping us achieve our goals. The cover was designed by Albert Everly.

A special note of appreciation goes to Edna Maine, Secretary at Monongalia County Vocational Technical Center who typed the final copy as well as the rough drafts.

We wish to acknowledge the use of materials used in curriculum guides, curriculum lab., newspapers, course outlines, text books, etc.

Many other persons helped plan this curriculum but space does not permit listing all of them. We were very pleased with the positive attitude shown by all the people we came in touch with. Without the encouragement of The Bureau of Vocational Education and in particular Dr. Fred Harrington, it would have been very difficult to have completed this curriculum.

REFERENCES

Architectural Graphic Standards
Ramsey-Sleeper
John Wiley & Sons

ARCHITECTURE, Design,
Engineering, Drawing
Second Edition
McKnight & McKnight
Bloomington, Illinois

Electrical and Electronics
Charles Baer
McGraw-Hill

Jigs and Fixture Design
Volume I and Volume II
Delmar Publishing

Mechanical Drawing
Eighth Edition
French & Svensen
McGraw-Hill

Process Piping Drafting
Second Edition
Gulf Publishing Company
Houston, Texas

BASIC DRAFTING PART I

UNIT: A Background of Drafting
B Lettering
C Sketching
D Instruments and their uses
E Geometric Constructions
F Basic Dimensioning
G Orthographic Projection
H Pictorial Drawing
I Auxiliaries
J Revolutions
K Inking
L Sectioning
M Threads and Fasteners
N Drafting Media & Reproduction
O Dimensioning
P Working Drawings
Q Omitted
R Intersections and Developments
S Cams
T Gears

TECHNICAL ILLUSTRATION PART II

UNIT: A What is Technical Illustration?

B Freehand Technical Sketching

C Isometric Drawing

D The Ellipse and Hexagon Templates

E Basic Techniques, Intersections and Sections

F The Ellipse as a Measuring Device

G Layout and Construction Methods

H Diometric and Trimetric Drawing

I Fasteners and Springs

J Perspectives Drawings

K Shading Techniques

L Oblique Drawings

M Inking Methods and Equipment

ARCHITECTURAL DRAFTING PART III

UNIT: A Techniques

B Symbols

C Lettering

D Use of References

E Building Site, Plot Plan, and Interior Design

F Dimensioning Floor Plan

G Footers and Foundations

H Wall Sections

I Exterior Design

J Plumbing

K Electrical

L Fireplaces

M Renderings

PIPING PART IV

UNIT: A Equipment and Terms

B Basic Piping Data - Symbols

C Basic Piping Data - Drawings

D Projection

ELECTRIC DRAFTING PART V

UNIT: A Techniques and Lettering

B Pictorial Drawing

C Device Symbols

D Production Drawings

E Block Flow Diagrams

F Miniaturization and Microelectronics

G Industrial Controls and Automation

H Drawings for Electric Power Field

I Electrical Drawing for Architectural Plans

J Graphical Representation of Data

JIGS AND FIXTURES PART VI

UNIT: A Design
B Classes of Fixtures
C Jigs
D Tool Design
E Material and Machines
F Purpose of Tool Design

HEATING AND AIR CONDITIONING PART VII

UNIT: A Common heat systems

B Symbols and Abbreviations

C HV & AC Terms

D Heat Loss Calculation

E Duct Systems

F Heat Piping Systems

G Duct Fitting and Layout

PART I

BASIC DRAFTING

STUDENT COMPETENCY SHEET

BD Unit A Comp 1 of 3

SPECIALIZATION: Basic Drafting

UNIT: A Background of Drafting

COMPETENCY STATEMENT: Know the general history of drafting

PERFORMANCE OBJECTIVE: Given a written test and references, you will be able to describe historical men and events with 90% accuracy.

LEARNING ACTIVITIES:

1. Read chapter I, pages 1-5, "Mechanical Drawing" and be prepared to discuss.
2. Take written quiz #1-Q on General History of Drafting. Must score a minimum of 90% correct.
3. If you have trouble with activities #1 or #2 ask the instructor for additional help.

EVALUATION:

Given a written test and references, you will describe historical men and events with 90% accuracy.

QUIZ 1-Q

ED Unit A Comp 1 of 3

UNIT: A Background of Drafting

I. MATCHING - 5 points each

_____ Eighteenth Century

_____ Gaspard Monage

_____ Claude Crozet

_____ Thomas Jefferson

_____ Frank Lloyd Wright

_____ Leonard De Vinci

_____ Pyramids

_____ People of Mesopotamia

_____ Romans

_____ Aqueducts

_____ West Point Graduates

_____ French & Sevenson

_____ Most precise method of graphically recording mans ideas

_____ The Parthenon

A. Drafting

B. 20th. Century Architect

C. Designed Monticello

D. Industrial Revolution

E. Monument of History

F. Designed Ledge Lighthouse

G. Started present day system of drawing

H. Famous greek temple

I. Notes on his drawings read from right to left

J. French Scholar

K. Made best drawings of the classical period

L. Used drafting materials as early as 2200 B.C.

M. English

N. Arched Bridges

O. Wrote test book

II. TRUE OR FALSE

T F Some of the ancient civilizations made sketches on clay tables.

T F American architecture and industry has declined since the 1800's.

T F Drafting materials were used before 2,200 B.C.

QUIZ 1-Q (Con't)

BD Unit A Comp 1 of 3

T F Leonard De Vinci was from France.

T F Monticello was a famous painter of the 17th. century.

T F Structural draftsmen prepare drawings of framework and other steel supporting members.

Answer Sheet 1-Q

BD Unit A Comp 1 of 3

UNIT: A Background of Drafting

I. A - most precise method of graphically recording mans ideas

B - Frank Lloyd Wright

C - Thomas Jefferson

D - Eighteenth Century

E - Pyramids

F - West Point Graduates

G - Gaspard Monage

H - The Parthenon

I - Leonard De Vinci

J - Claude Crozet

K - Romans

L - People of Mesopotamia

M - ----- Blank ------

N - Aqueducts

O - French & Sevenson

II. True

False

True

True

False

True

STUDENT COMPETENCY SHEET

BD Unit A comp 2 of 3

SPECIALIZATION: Basic Drafting

UNIT: A Background of Drafting

COMPETENCY STATEMENT: Know the different types of drafting

PERFORMANCE OBJECTIVE: Given a quiz and references, you will be able to define the different types of drafting with 90% accuracy.

LEARNING ACTIVITIES:

1. Read chapter I, pages 6-12 in "Mechanical Drawing" and be prepared to discuss.
2. Make a list of employers, in the local area, that might use draftsmen. Present this list to the instructor.
3. Observe drawings, on bulletin board, of the different types of drafting.
4. Visit professional drafting room.
5. Take written quiz #2-Q on types of drafting. Must score a minimum of 90% correct.
6. If you have trouble with activities 1-5, ask the instructor for additional help.

EVALUATION:

Given a quiz and references, you will describe the different types of drafting with 90% accuracy.

QUIZ 2-Q

BD Unit A Comp 2 of 3

UNIT: A Background of Drafting

7 points each

1. List at least 6 specialized drafting areas
   - a.
   - b.
   - c.
   - d.
   - e.
   - f.
2. List 3 types of technical drawings
   - a.
   - b.
   - c.
3. List 4 levels of graphic comunication
   - a.
   - b.
   - c.
   - d.
4. Technical drawing is the ______________________ language of industry.
5. Mock-ups and scale models are used as a means of ________________ a design.

Answer Sheet 2-Q

BD Unit A of Comp 2 of 3

UNIT: A Background of Drafting

7 points each

1. a. architectural
    b. aerospace
    c. structural
    d. machine
    e. electrical
    f. electronics
    g. piping
    h. technical - illustrations
    i. sheet metal
    j. civil
2. a. multiview
    b. pictorial
    c. schematic
3. a. creative communication
    b. technical communication
    c. market communication
    d. construction communication
4. universal
5. checking

STUDENT COMPETENCY SHEET

BD Unit A Comp 3 of 3

SPECIALIZATION: Basic Drafting

UNIT: A Background of Drafting

COMPETENCY STATEMENT: Know how to choose a career in drafting.

PERFORMANCE OBJECTIVE: Given a handout sheet and any references, you will be able to complete the diagrams shown on handout sheet #101 with 100% accuracy. Diagrams must meet standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter I, pages 12-14, "Mechanical Drawing", and be prepared to discuss.
2. Read handout sheet #100 on fringe benefits of a draftsman.
3. Complete handout sheet #101 on "Career in Drafting". Must score a minimum of 100% correct.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

Given a handout sheet and any references, you will complete the diagrams on handout sheet #101 with 100% accuracy. Diagrams must meet standards set forth in "Mechanical Drawing" and by the instructor.

HANDOUT SHEET #100

BD Unit A comp 3 of 3

UNIT: A Background of Drafting

Fringe Benefits of the average professional Draftsmen.

1. Works indoors
2. Well lighted
3. Well ventilated
4. Air Conditioned
5. Quiet Surroundings
6. Little contact with the general public
7. 8 hour day, 40 hour week
8. Overtime
9. Sick leave
10. Insurance
11. White collar worker
12. Responsibility
13. Job security
14. Excellent opportunity for advancement
15. Good starting salary
16. Continues demand for draftsmen
17. Excellent money for experienced draftsmen
18. 9 out of 10 draftsmen are women
19. Excellent equipment to draw with
20. Over 300,000 men and women working as draftsmen

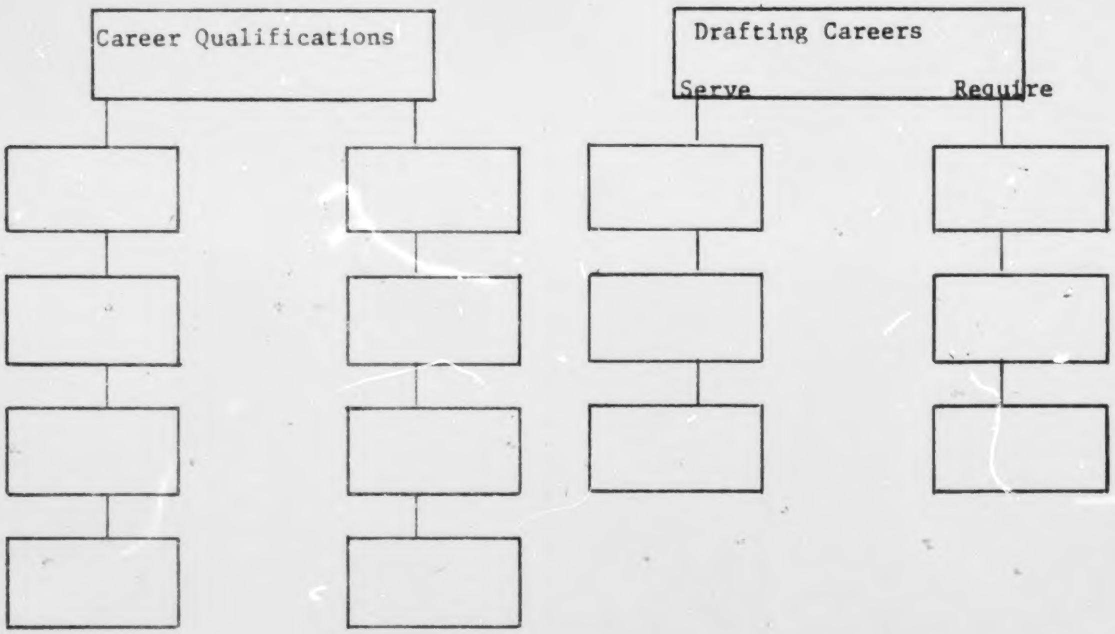
Requirement of a average professional Draftsmen.

1. Be able to sit for long periods of time
2. Have prolonged concentration
3. Be able to work closely with other draftsmen and engineers
4. Be able to take criticism
5. Good eye sight
6. Good math background
7. Have some artistic ability
8. Have common sense
9. Hand and finger dexterity
10. A good sense of proportion
11. Neat
12. Accurate
13. Be able to express one's self well, both written and orally
14. Mechanical aptitude
15. Be able to accept responsibility
16. Patience
17. Tact
18. Creative
19. Should have attended a vocational school, technical school or a university

HANDOUT SHEET #101

BD Unit A Comp 3 of 3

UNIT: A Background of Drafting



DIRECTIONS:

Complete the career qualification chart by putting the required qualifications in each of the blank blocks. Complete the chart on drafting careers by listing 3 different careers served by draftsmen and the technical requirements for the positions.

HANDOUT ANSWER SHEET #101

BD Unit A Comp 3 of 3

UNIT: A Background of Drafting

Career Qualifications

aptitude for detail

accuracy and neatness

organizer

like preparing details

logical

resourceful

systematic

like graphical communications

Drafting Careers

Serve	Require
architects	drafting aptitudes
engineers	math science
designers	experience

STUDENT COMPETENCY SHEET

BD Unit B Comp 1 of 3

SPECIALIZATION: Basic Drafting

UNIT: B Lettering

COMPETENCY STATEMENT: Letter using vertical lettering techniques

PERFORMANCE OBJECTIVE: Given a lettering sheet, "H" pencil and any available references, you will be able to use vertical lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #102. Your lettering must meet the standards set forth by handout sheet #102 and by the instructor.

LEARNING ACTIVITIES:

1. Read Appendix A, pages 530 and 535 in "Mechanical Drawing" and be prepared to discuss.
2. Read handout sheet 102 and be prepared to discuss.
3. Ask instructor for lettering sheet and practice vertical lettering strokes as illustrated on handout sheet #102. Complete one full lettering sheet.
4. Have lettering sheet approved by instructor.
5. Fill out five lines of lettering at the beginning of each class period until instructor tells you otherwise.

BD Unit B Comp 1 of 3

EVALUATION:

Given a lettering sheet, "H" pencil and any available references, you will use vertical lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #102. Your lettering must meet the standards set forth by handout sheet #102 and by the instructor.

HANDOUT SHEET 102 VERTICAL LETTERING

BD Unit B Comp 1 of 3

UNIT: B Lettering

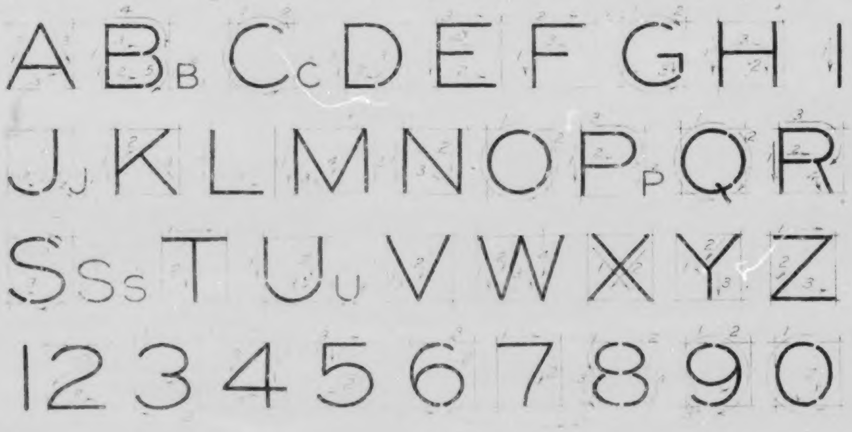
Good technique is as essential in lettering as in drawing. The lettering really makes a drawing.

The first requirement in lettering is the holding of the pencil correctly. Hold the pencil comfortably with the thumb, forefinger and second finger. Vertical, slanting, and curved strokes are drawn with a steady finger movement: horizontal strokes are made with some pivioting of the hand and wrist. To keep the point round, you must form the habit of rotating the pencil after every few strokes.

SINGLE - STROKE VERTICAL CAPITALS

The vertical, single-stroke, commercial Gothic letter is a standard for titles, reference, letters, architectural, work etc. As for the proportion of width to height, the general rule is that the smaller the letters are, the more extended they should be in width. A low extended letter is more legible than a high compressed one and at the same time makes a better appearance.

For proficiency in lettering it is necessary to learn the form of each letter. Individuality in lettering is often as common in handwriting.



STUDENT COMPETENCY SHEET

BD Unit B Comp 2 of 3

SPECIALIZATION: Basic Drafting

UNIT: B Lettering

COMPETENCY STATEMENT: Letter using inclinded lettering techniques

PERFORMANCE OBJECTIVE: Given a lettering sheet, "H" pencil and any available references. You will be able to use inclinded lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #103. Your lettering, must meet the standards set forth by the handout sheet #103 and by the instructor.

LEARNING ACTIVITIES:

1. Read Appendix A, pages 530 and 535 in "Mechanical Drawing", and be prepared to discuss.
2. Read handout sheet #103 and be prepared to discuss.
3. Ask instructor for lettering sheet and practice inclinded lettering strokes as illustrated on handout sheet #103. Complete one full lettering sheet.
4. Have lettering sheet approved by instructor.
5. Fill out five lines of lettering at the beginning of each class period until instructor tells you otherwise.

BD Unit B Comp 2 of 3

EVALUATION:

Given a lettering sheet, "H" pencil and any available references, you will use inclinded lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #103. Your lettering must meet the standards set forth by handout sheet #103 and by the instructor.

HANDOUT SHEET #103 INCLINED LETTERING

BD Unit B Comp 2 of 3

UNIT: B Lettering

Many draftsmen use the inclined, or slant, lettering instead of the vertical lettering. The order and direction of the strokes are the same as the vertical lettering.

The inclined lettering should slope at a 67 1/2° angle.

Professional appearance in lettering is due to three things:

(1). Keeping to a uniform slope.

(2). Have the letters full and well shaped.

(3). Keep the spacing of the letters equal.

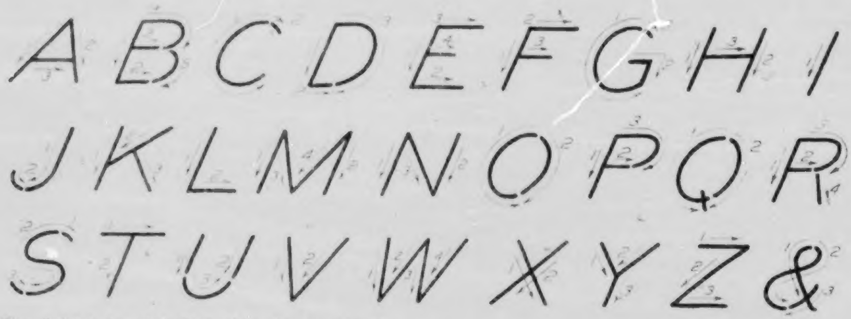
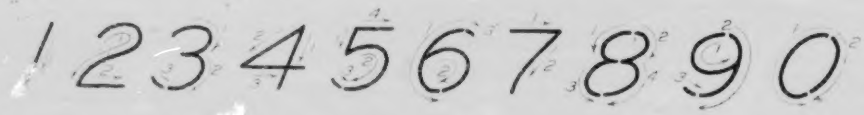


Fig. 3-11d. An alphabet of inclined capitals.



STUDENT COMPETENCY SHEET

BD Unit B Comp 3 of 3

SPECIALIZATION: Basic Drafting

UNIT: B Lettering

COMPETENCY STATEMENT: Letter using lower case lettering techniques.

PERFORMANCE OBJECTIVE: Given a lettering sheet, "H" pencil and any available references, you will be able to use lower case lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #104. Your lettering must meet the standards set forth by handout sheet #104 and by the instructor.

LEARNING ACTIVITIES:

1. Read handout sheet #104 and be prepared to discuss.
2. Ask instructor for lettering sheet and practice lower case lettering strokes as illustrated on handout sheet #104. Complete one full lettering sheet.
3. Have lettering sheet approved by instructor.

EVALUATION:

Given a lettering sheet, "H" pencil and any available references, you will use lower case lettering to fill one lettering sheet using the lettering techniques shown on handout sheet #104. Your lettering must meet the standards set forth by handout sheet #104 and by the instructor.

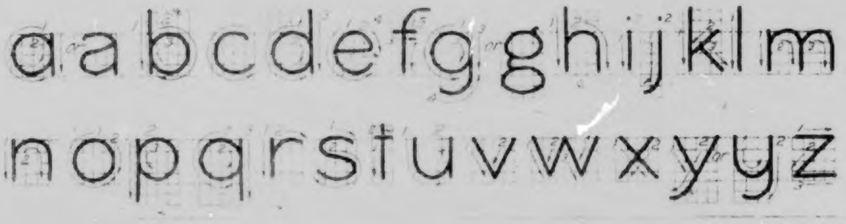
HANDOUT SHEET #104 LOWER CASE LETTERING

BD Unit B comp 3 of 3

UNIT: B Lettering

The single-stroke, lower case lettering is not commonly used on machine drawings but is used extensively on structural steel and map drawings. It is the standard letter in government topographic drawing. The body of the letters should be made two-thirds the height of the capitals with ascenders extending to the capital line and descenders dropping the same distance below. The basic form of the letter is a combination of a circle and a straight line.

The following is an example of vertical lower-case lettering. The slant lower-case lettering is the same except on an incline.



STUDENT COMPETENCY SHEET

BD Unit C Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: C Sketching

COMPETENCY STATEMENT: Make freehand sketches

PERFORMANCE OBJECTIVE: Given problem sheets, "H" pencil, paper and references. You will be able to sketch the necessary views of the given objects on problem sheets C-1, C-2, and C-3. The sketches must meet the standards set forth in the text book "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 2 pages 15-41 in "Mechanical Drawing" and be prepared to discuss.
2. Attend a demonstration given by the instructor on making freehand sketches of basic objects.
3. Ask instructor for graph paper and sketch objects on problem sheets C-1, C-2, and C-3
4. If you have trouble with activities 1-3, ask instructor for additional help.

EVALUATION:

Given problem sheets, "H" pencil, paper and references, you will sketch the necessary views of the given objects on problem sheets C-1, C-2, and C-3. The sketches must meet the standards set forth in text book "Mechanical Drawing" and by the instructor.

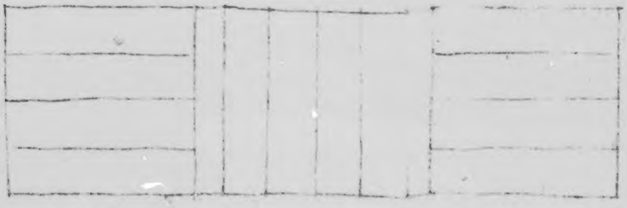
PROBLEM SHEET #C-1

BD Unit C Comp 1 of 1

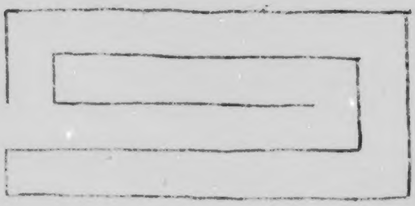
UNIT: C Sketching

DIRECTIONS:

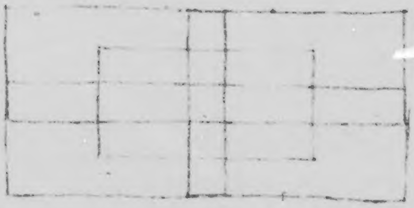
Ask instructor for a piece of 8 1/2" x 11" grid paper. All distances and angles are to be estimated by "eye". Six problems may be worked per sheet. Use back of grid paper also.



PROB. 2·1



PROB. 2·2



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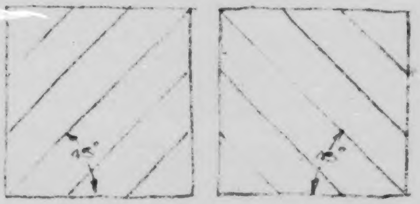

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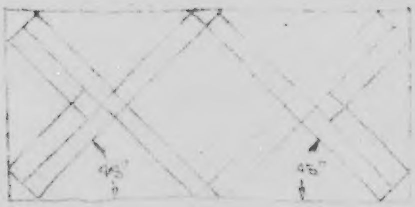

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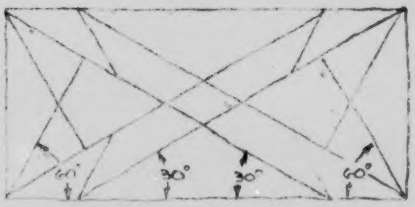


PROB. 2·6

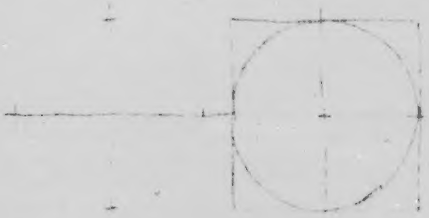
PROBLEM SHEET #C-2

BD Unit C Comp 1 of 1

UNIT: C Sketching

DIRECTIONS:

Ask instructor for a piece of 8 1/2" x 11" grid paper. All distances and angles are to be estimated by "eye". Six problems may be worked per sheet. Use back of grid paper also.



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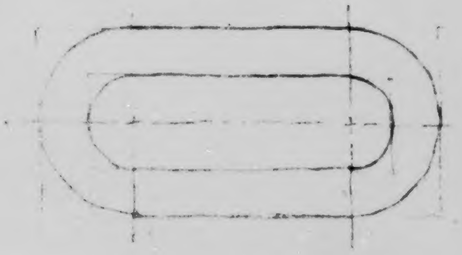

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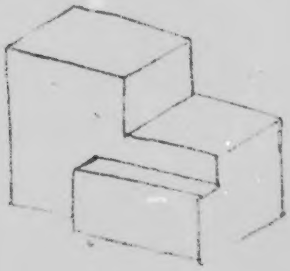

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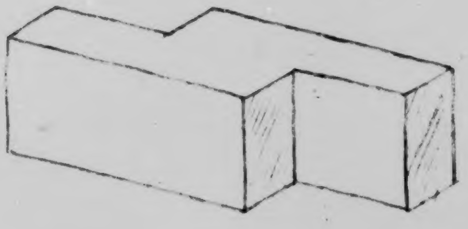
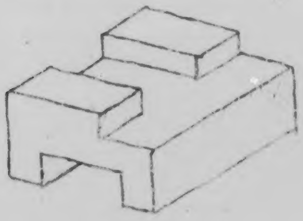
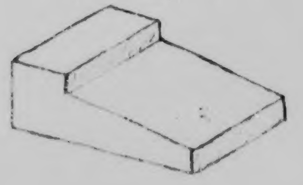


PROB. 2·10



PROB. 2·11



PROB. 2·12

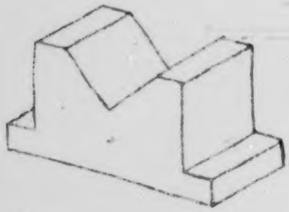
PROBLEM SHEET #C-3

BD Unit C Comp 1 of 1

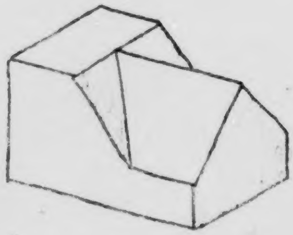
UNIT: C Sketching

DIRECTIONS:

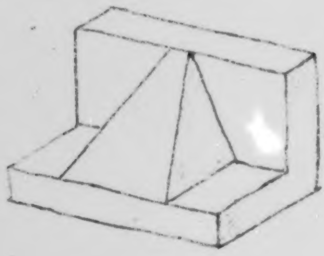
Ask instructor for a piece of 8 1/2" x 11" grid paper. All distances and angles are to be estimated by "eye". Six problems may be worked per sheet. Use back of grid paper also.



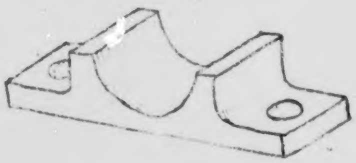
PROB. 2·13



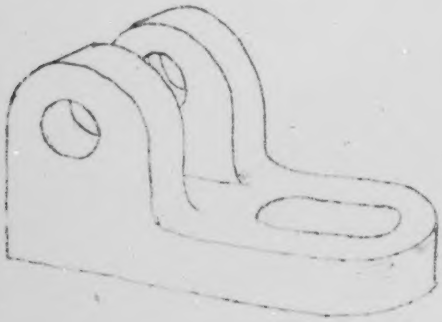
PROB. 2·14



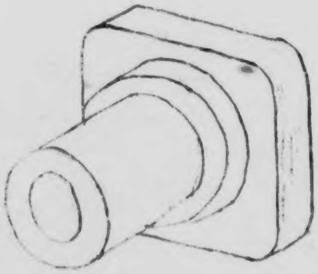
PROB. 2·15



PROB. 2·16



PROB. 2·17



PROB. 2·18

STUDENT COMPETENCY SHEET

BD Unit D Comp 1 of 4

SPECIALIZATION: Basic Drafting

UNIT: D Instruments and their use

COMPETENCY STATEMENT: Know the terminology and the proper use of the drawing instruments.

PERFORMANCE OBJECTIVE: Given a series of pictures or an actual display of drawing instruments and no references, you will be able to identify each drawing instrument with 100% accuracy. All answers must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter #3 pages 42-63 in "Mechanical Drawing" and be prepared to discuss.
2. Attend and participate in demonstration given by the instructor on the care and use of drafting instruments.
3. If you have problems with activities 1-2, ask your instructor for help and additional activities if necessary.
4. Obtain problem sheet #D-1, #D-2 and #D-3 and identify each of the given objects. Must answer with 100% accuracy.

EVALUATION:

Given a series of pictures or an actual display of drawing instruments and no references, you will identify each drawing instruments with 100% accuracy. All answers must meet the standards set forth in "Mechanical Drawing" and by the instructor.

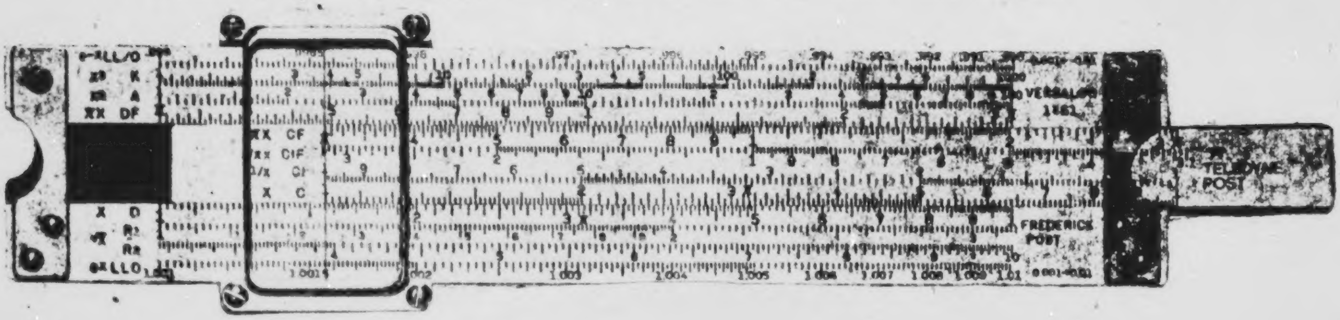
PROBLEM SHEET #D-1

BD Unit D Comp 1 of 4

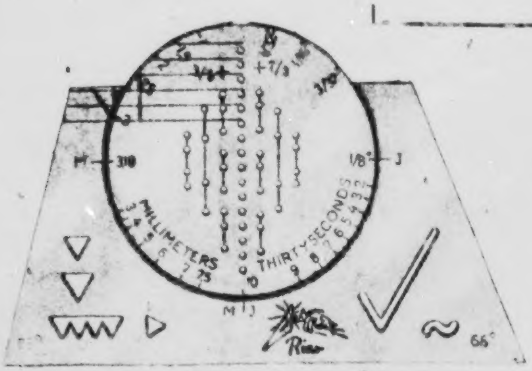
UNIT: D Instruments and their use.

DIRECTIONS:

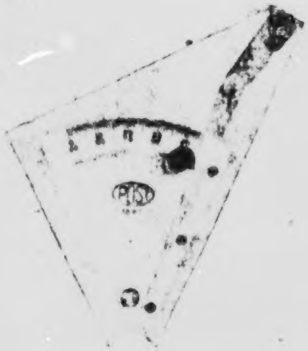
Identify each of the given objects on the line below the object.



1. ______________________

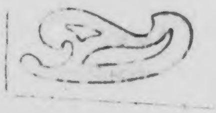


2. ______________________



3. ______________________

4. ______________________



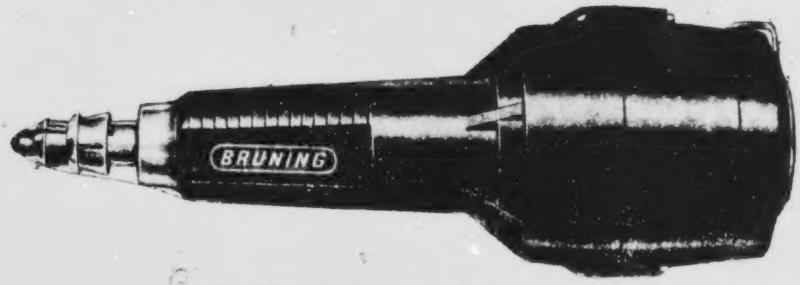
5. ______________________

PROBLEM SHEET #D-1 (con't)

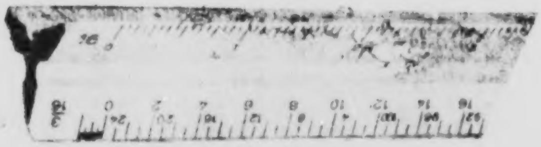
BD Unit D Comp 1 of 4

UNIT: D Instruments and their use

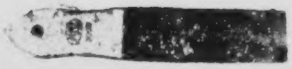
DIRECTIONS: Identify each of the given objects on the line below the object.



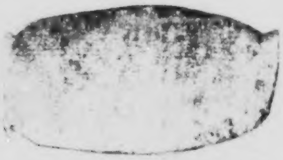
6. ______________________



7. ______________________



8. ______________________



9. ______________________

____

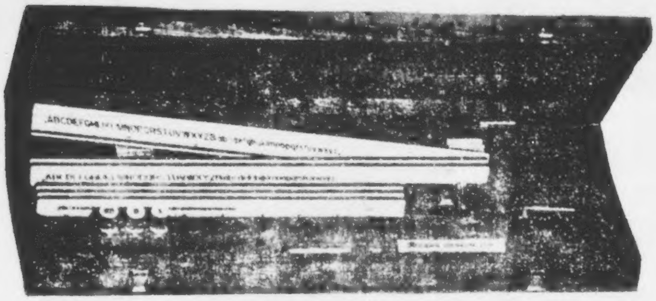
PROBLEM SHEET #D-2

BD Unit D Comp 1 of 4

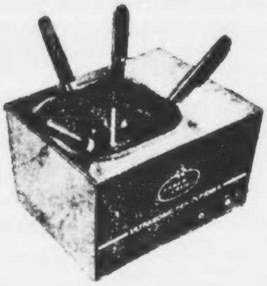
UNIT: D Instruments and their use

DIRECTIONS:

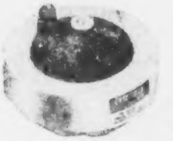
Identify each on the given objects on the line below the object.



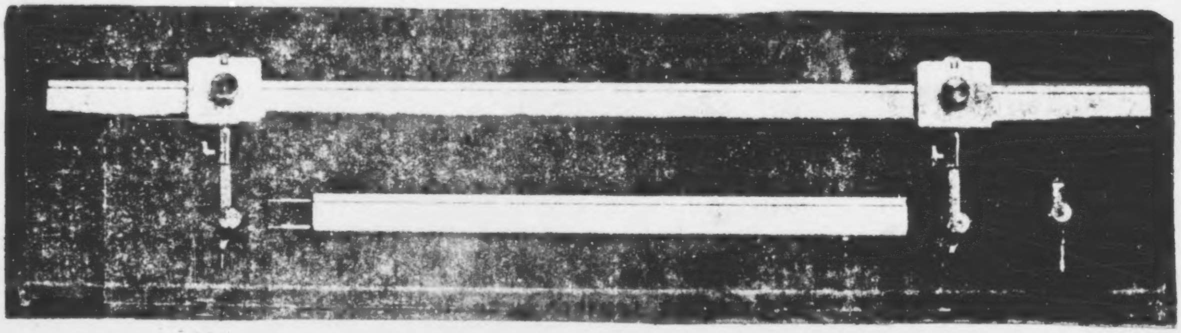
10. ______________________________



11. ____________________



12. ________________



13. ________________________

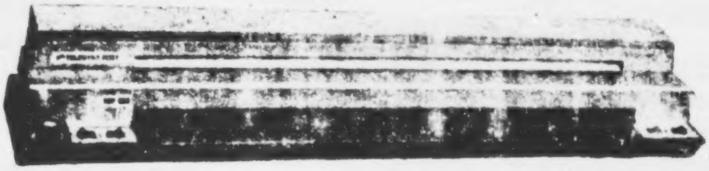
PROBLEM SHEET #D-2 (CON'T)

BD Unit D Comp 1 of 4

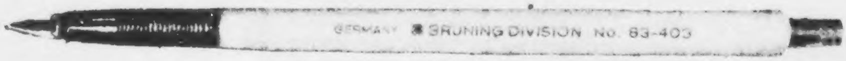
UNIT: D Instruments and their use

DIRECTIONS:

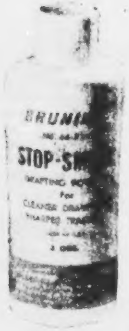
Identify each of the given objects on the line below the object.



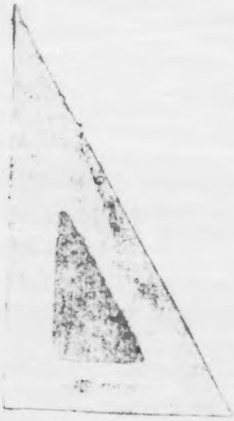
14. ______________________



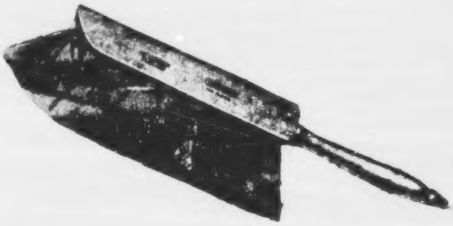
15. ______________________



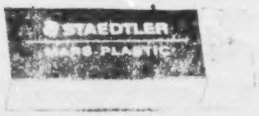
17. ______________________



16. ______________________



18. ______________________



19. ______________________

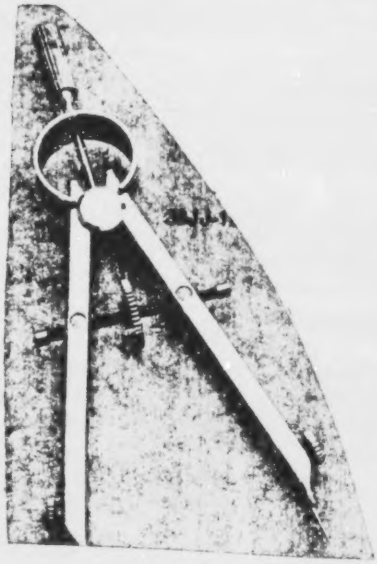
PROBLEM SHEET #D-3

BD Unit D Comp 1 of 4

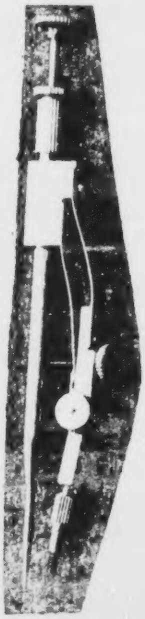
UNIT: D Instruments and their use

DIRECTIONS:

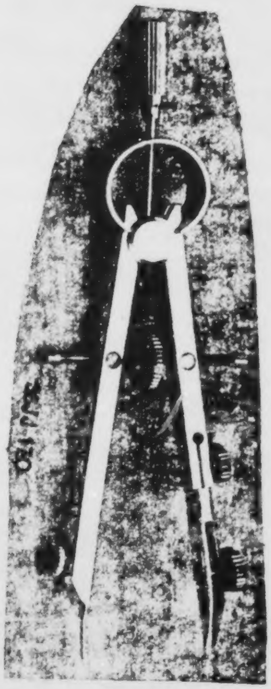
Identify each of the given objects on the line below the object.



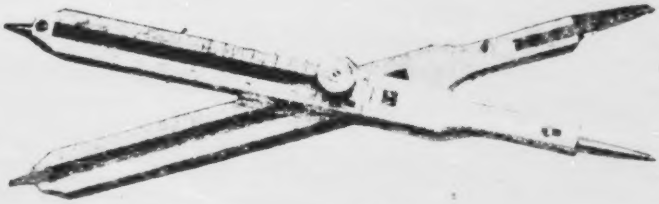
20. ____________________



21. ____________________



22. ____________________



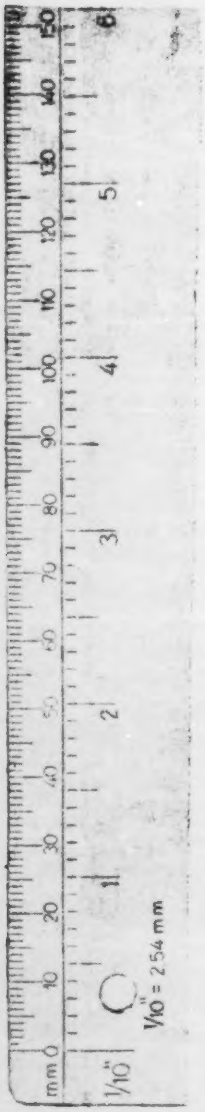
23. ____________________

PROBLEM SHEET #D-3 CON'T)

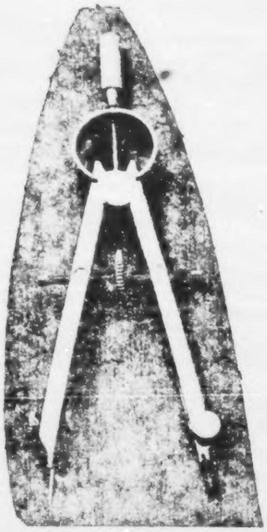
BD Unit D Comp 1 of 4

UNIT: D Instruments and their use

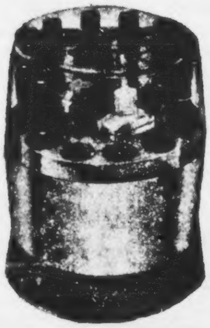
DIRECTIONS: Identify each of the given objects on the line below the object.



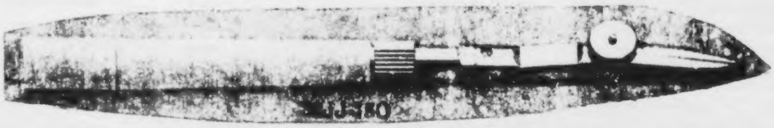
24. ____________________



25. ____________________



27. ____________________
____



26. ____________________

ANSWER SHEET #D-1

BD Unit D Comp 1 of 4

UNIT: D Instruments and their use.

1. Slide Rule
2. Ames Lettering Guide
3. Adjustable 45° Triangle
4. Erasing Shield
5. French Curve
6. Electric Eraser
7. Architects Scale
8. Sand Block
9. Rosin Bag
10. LeRoy Lettering Set
11. Pen Cleaner
12. Pencil Pointer
13. Beam Compass
14. Print Machine
15. Lead Holder or Mechanical Pencil
16. 30° 60° Triangle
17. Drafting Powder
18. Drafting Brush
19. Film Eraser
20. Bow Dividers
21. Drop Bow Compass
22. Bow Pen
23. Proportional Dividers
24. Metric Scale
25. Bow Compass
26. Ruling Pen
27. Rapidagraph

STUDENT COMPETENCY SHEET

BD Unit D Comp 2 of 4

SPECIALIZATION: Basic Drafting

UNIT: D Instruments and their use

COMPETENCY STATEMENT: Use of architects, engineers and metric scales.

PERFORMANCE OBJECTIVE: Given an architects scale, engineers scale, metric scale, basic drafting tools and any references needed, you will be able to demonstrate your ability in the use of the architects scale, engineers scale and metric scale by measuring various line lengths at indicated scales with 100% accuracy.

LEARNING ACTIVITIES:

1. Read chapter 3 pages 53-56 "Mechanical Drawing" and be prepared to discuss.
2. Attend and participate in instructors lecture and demonstration on the use of the architects scale, engineers scale and metric scale.
3. Obtain problem sheet #D-4 containing a number of lines and scales, measure or draw lines as indicated.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

Given an architects scale, engineers scale, metric scale, basic drafting tools and any references needed, you will demonstrate your ability in use of the architects scale, engineers scale, and metric scale by measuring various line lengths at indicated scales with 100% accuracy.

PROBLEM SHEET #D-4

Unit D Comp 2 of 4

UNIT: D Instruments and their use

DIRECTIONS:

Measure given lines using specified scale.

1. Use architects scale:

ANS.

FULL ____________

3"=1'-0 ____________

3/32"=1'-0 ____________

3/4"=1'-0 ____________

1/8"=1'-0 ____________

1/4"=1'-0 ____________

2. Use engineers scale:

1"=10'-0 ____________

1"=40'-0 ____________

1"=20'-0 ____________

1"=30'-0 ____________

1"=100' ____________

3. Use metric scale:

1:1 ____________

1:5 ____________

1:33 1/3 ____________

1:75 ____________

ANSWER SHEET #D-4

Unit D Comp 2 of 4

UNIT: D Instruments and their use

1. a. 4'-6"
   b. 8"
   c. 19'-6"
   d. 3'-4"
   e. 20'-2"
   f. 8'-3"
2. a. 35'-0
   b. 133'-0
   c. 82'-6"
   d. 104'-0
   e. 310'-0
3. a. 69mm
   b. 482mm
   c. 1.78mm
   d. 6.25mm

STUDENT COMPETENCY SHEET

BD Unit D Comp 3 of 4

SPECIALIZATION: Basic Drafting

UNIT: D Instruments and their use

COMPETENCY STATEMENT: Draw title block and border lines for a standard sheet layout.

PERFORMANCE OBJECTIVE: Given the necessary materials, equipment and references, you will draw title strips and border lines for a standard sheet layout. This must be done as illustrated on handout sheet #107.

LEARNING ACTIVITIES:

1. Study handout sheet #107 and #108.
2. Attend a demonstration given by your instructor on drawing title strips and border lines. After the demonstration, make a sheet layout and present it to the instructor for evaluation.
3. If you have problems with learning activities 1 - 2, ask the instructor for help and additional activities if necessary.

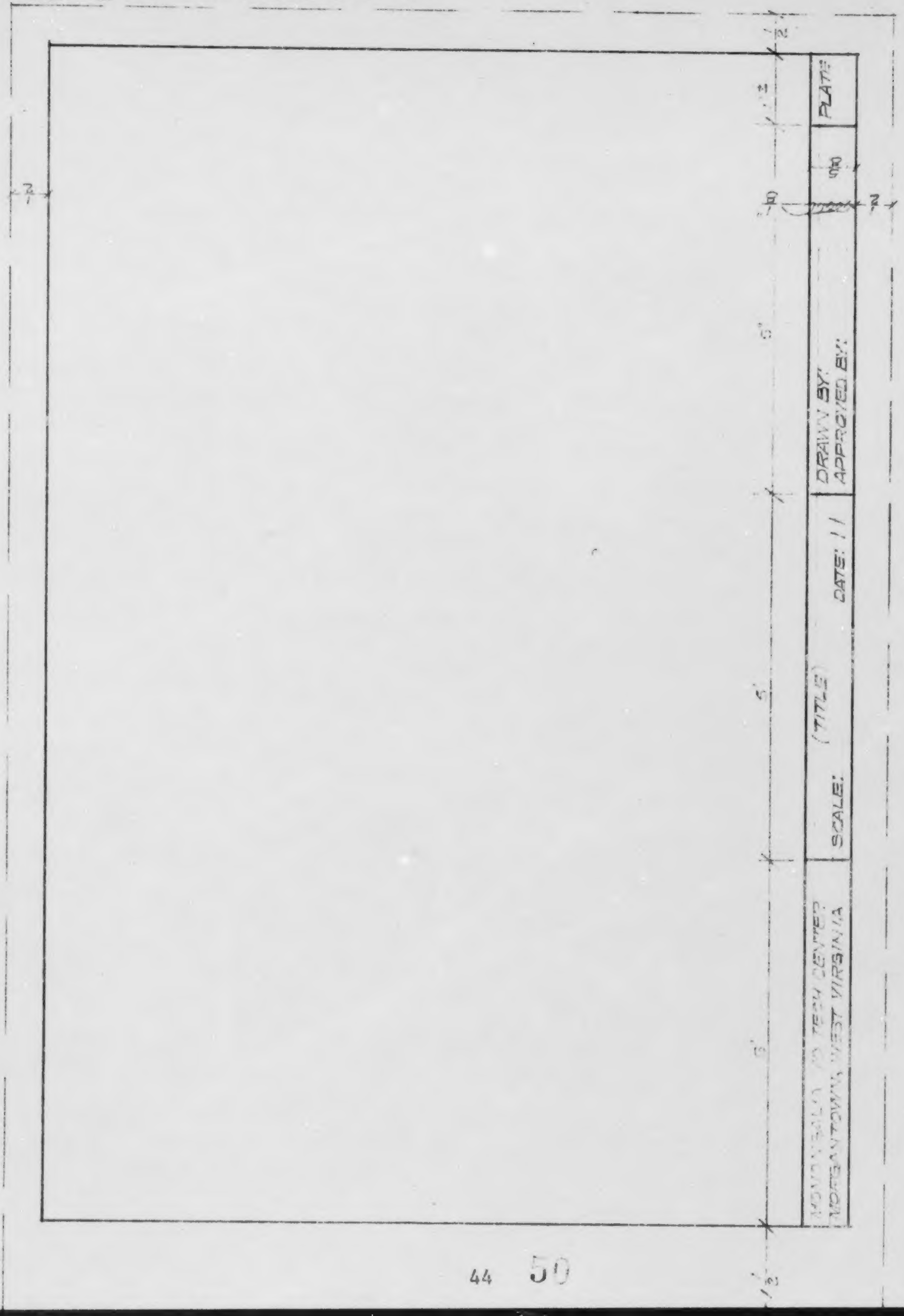
EVALUATION:

Given the necessary materials, equipment and references, you will draw title strips and border lines for a standard sheet layout. This must be done as illustrated on handout sheet #107.

HANDOUT SHEET #107

Unit D Comp 3 of 4

UNIT: D Instruments and their use

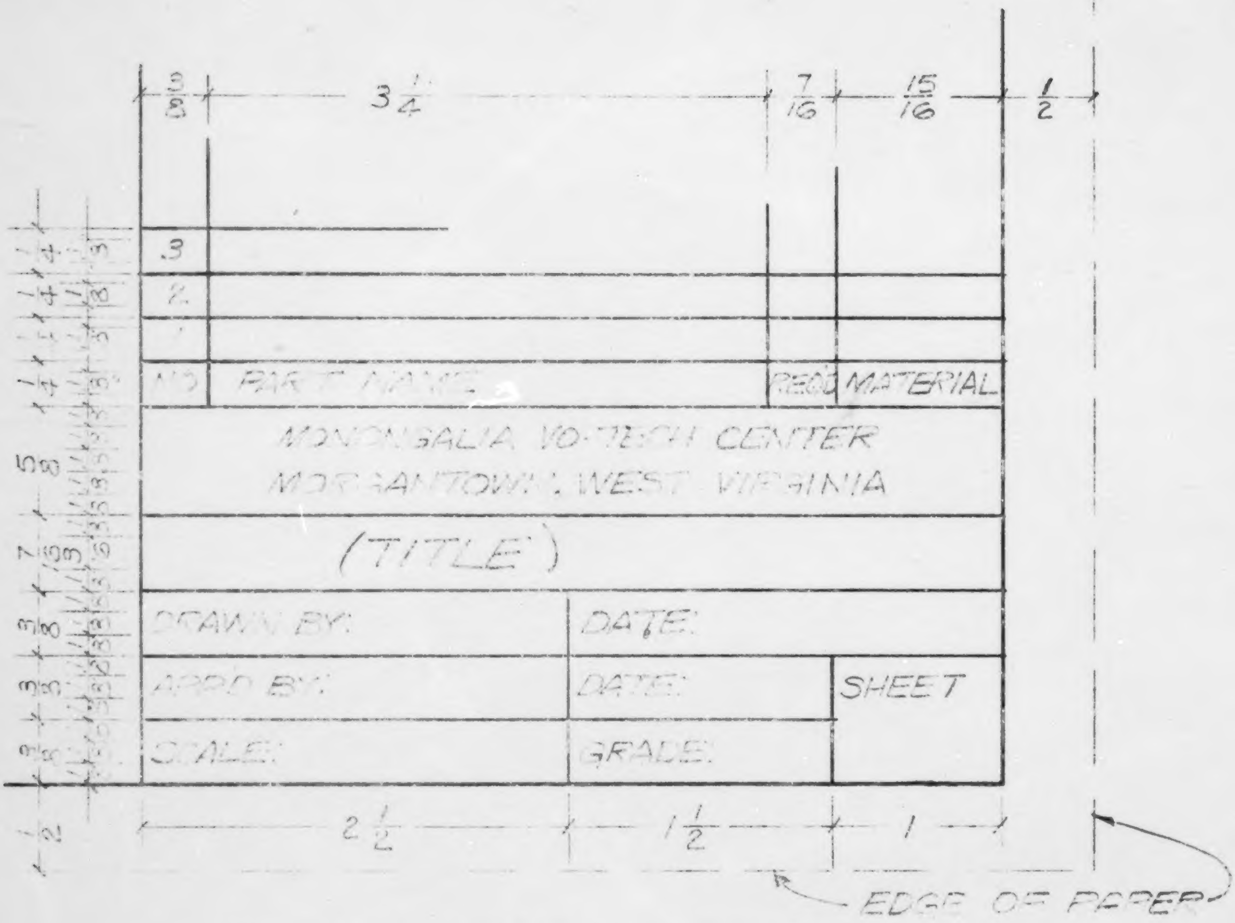


STANDARD TITLE BLOCK FOR 12" x 18" SIZE PAPER

HANDOUT SHEET #108

BD Unit D Comp 3 of 4

UNIT: D Instruments and their uses



STANDARD TITLE BLOCK FOR 18 x 24 AND 24 x 36 SIZE PAPER

STUDENT COMPETENCY SHEET

BD Unit D Comp 4 of 4

SPECIALIZATION: Basic Drafting

UNIT: D Instruments and their uses

COMPETENCY STATEMENT: Identifies and draws line symbols

PERFORMANCE OBJECTIVE: Given basic drafting tools, a lost of line symbols and no references, you will be able to draw the different line symbols and list the correct lead weights for each line symbol as shown on handout sheet #108.

LEARNING ACTIVITIES:

1. Read chapter #3 pages 47 and 48 "Mechanical Drawing" and be prepared to discuss.
2. Study handout sheet #108, Alphabet of lines
3. Read directions and work problems on problem sheets #D-4, D-5, D-6, D-7, D-8, D-9, D-10 and D-11. Use 12 x 18 sheet of paper and title block. Center each problem in center of working space.
4. Complete quiz #3-Q, "Line Symbols".
5. If you have problems with learning activities 3 or 4, ask the instructor for additional help.

EVALUATION:

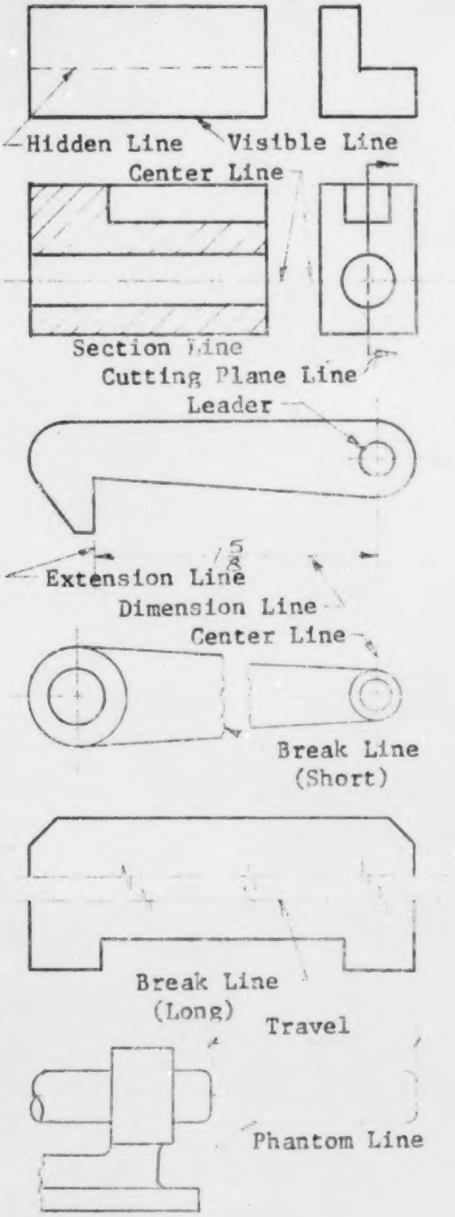
Given basic drafting tools, a lost of line symbols and no references, you will draw the different line symbols and list the correct lead weights for each line symbol as shown on handout sheet #108.

HANDOUT SHEET #108

BD Unit D Comp 4 of 4

UNIT: D Instruments and their uses

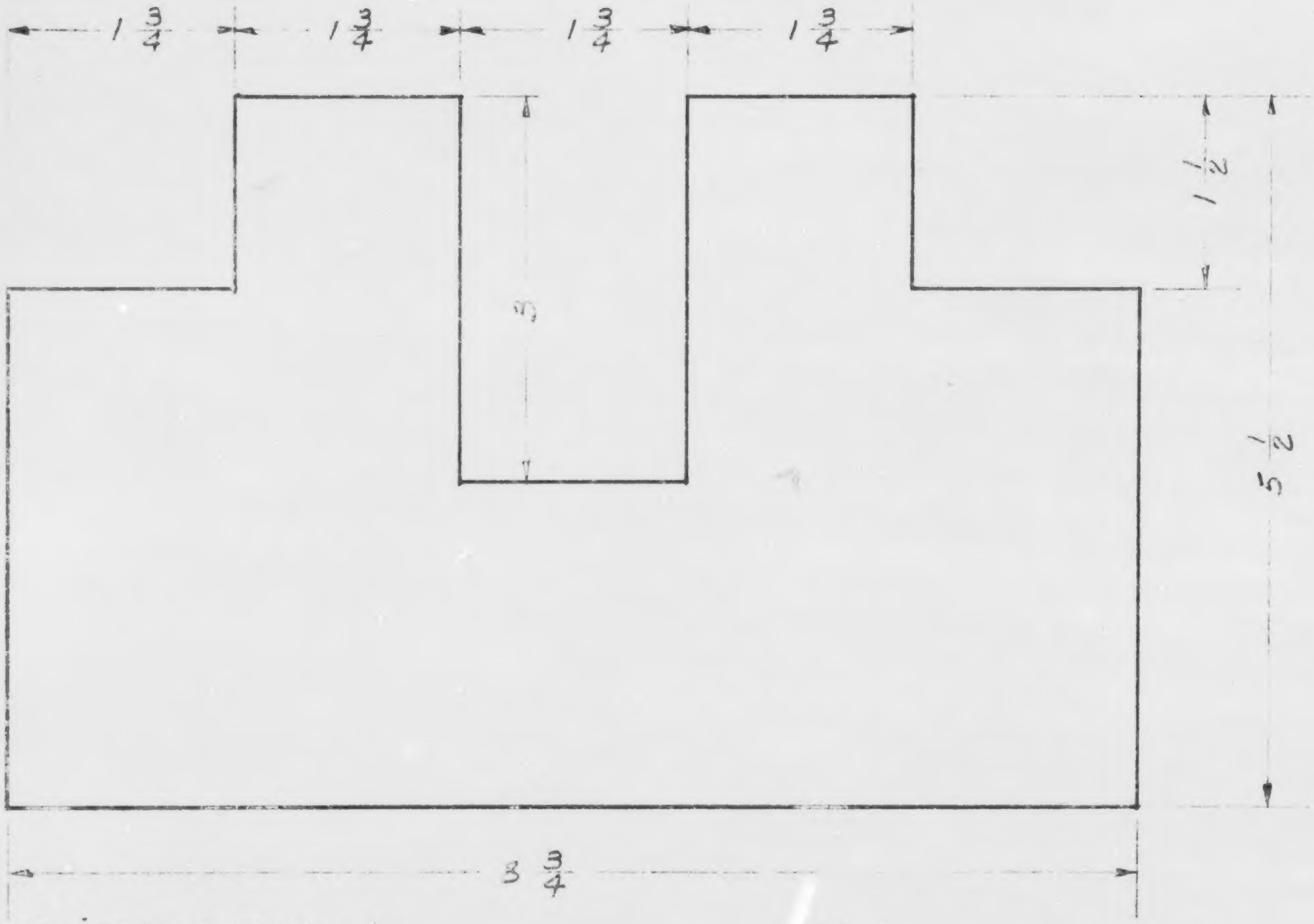
The alphabet of lines and pencil weights for pencil drawings and how they are used.



Visible line	Thick (HB)
Hidden line	Medium (Sharp 2H)
Section line	Thin (Sharp 2H)
Center line	Thin (Sharp 2H)
Extension line	
Dimension line	Thin (Sharp 2H)
Dimension line	Thin
Cutting-plane line or viewing plane line	Thick (HB or 2B)
Cutting-plane line or viewing-plane line	Thick (HB or 2B)
Break line	Thick (2H)
Break line	Thin (Heavy 6H)
Phantom line	Thin (Heavy 6H)

BD Unit D Comp 4 of 4

PROBLEM SHEET #D-4



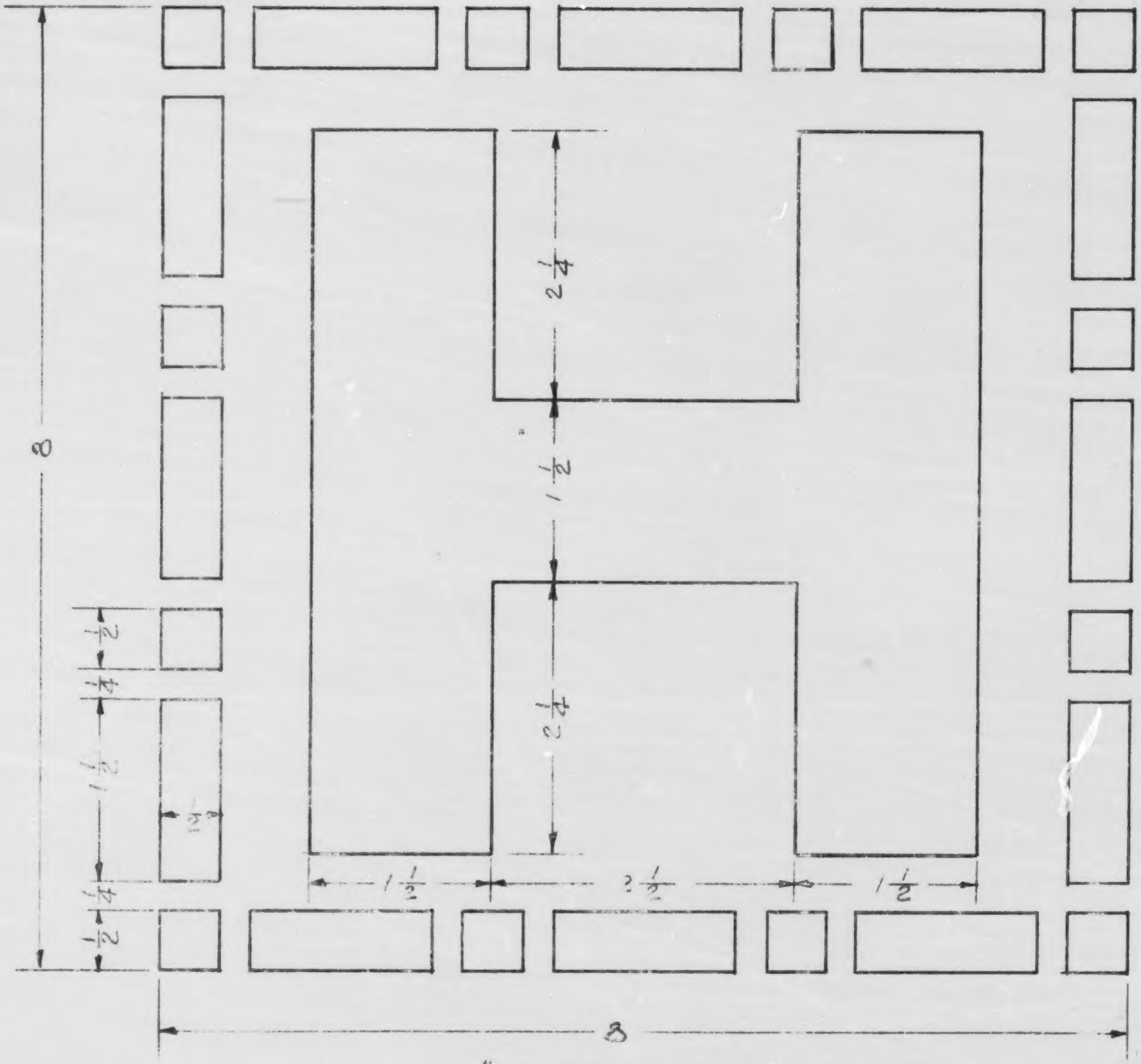
THE STUDENT WILL—
1. USE PROPER LINE WEIGHTS & LETTERING
2. CENTER PROBLEM
3. DIMENSION CORRECTLY
4. DEMONSTRATE NEATNESS
5 USE 12x18 SIZE PAPER & TITLE BLOCK

TEMPLATE

PROB #D-4

BD Unit D Comp 4 of 4

PROBLEM SHEET #D-5

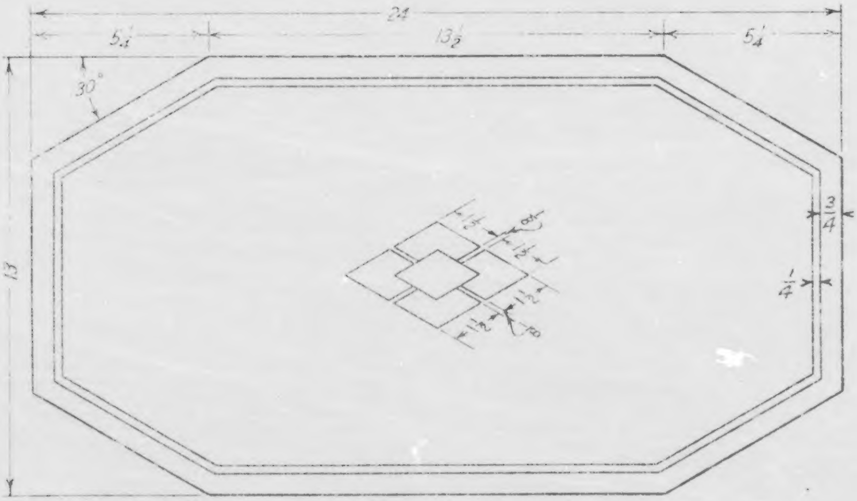


STENCIL

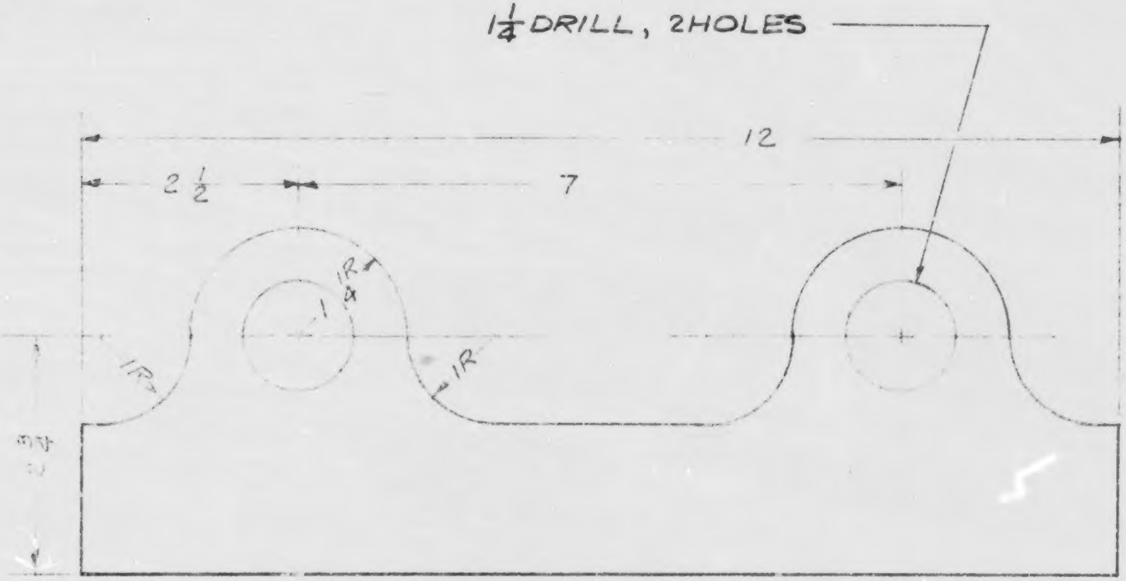
PROB #D-5

PROBLEM SHEET #D-6

BD Unit D Comp 4 of 4

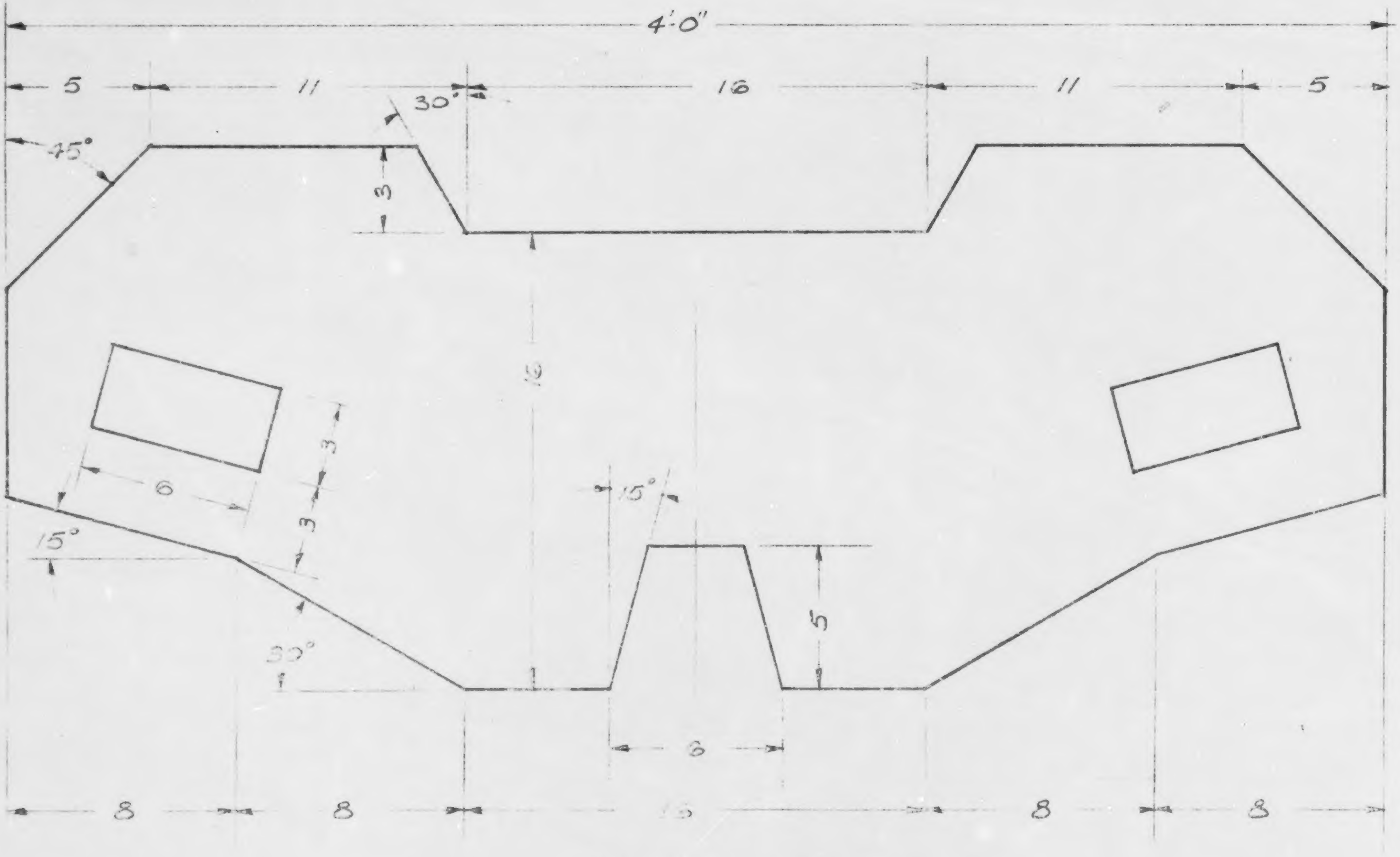


PROBLEM SHEET #D-7



SHIM

PROB. #D-7



SHEARING BLOCK

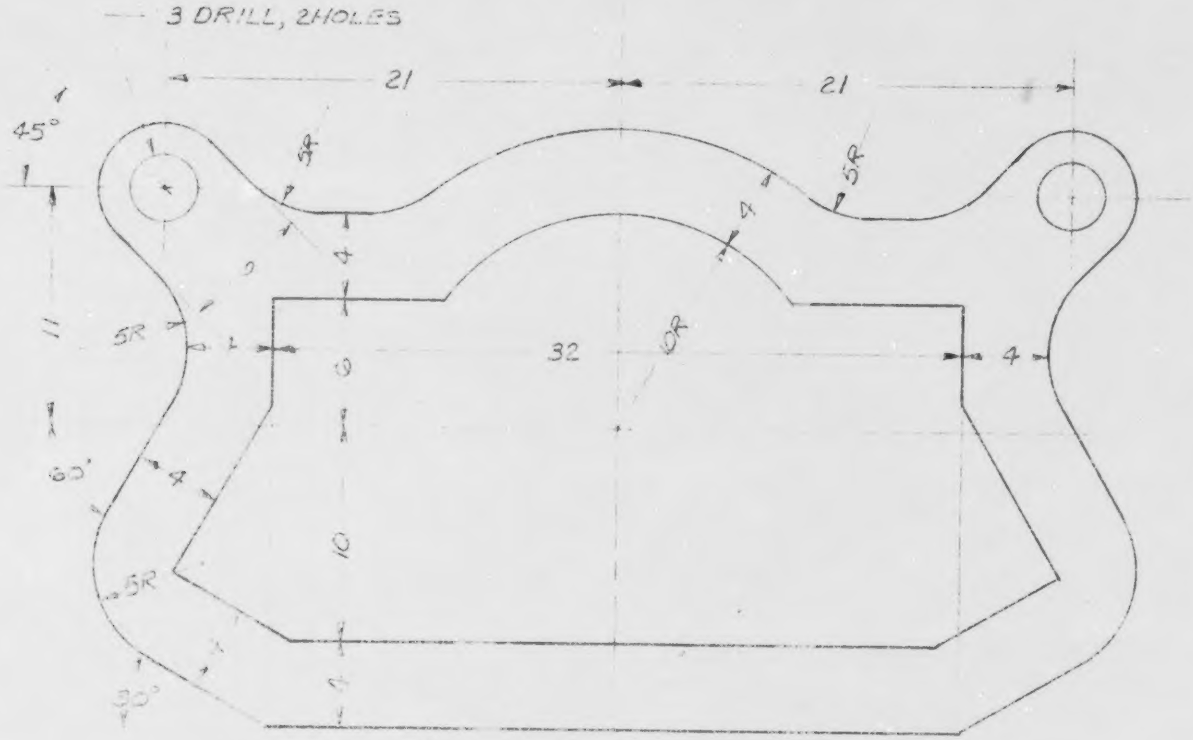
DIRECTIONS:
1. USE SCALE: 3"=1'-0

PROB #D-8

PROBLEM SHEET #D-8

BD Unit D Comp 4 of 4

PROBLEM SHEET #D-9

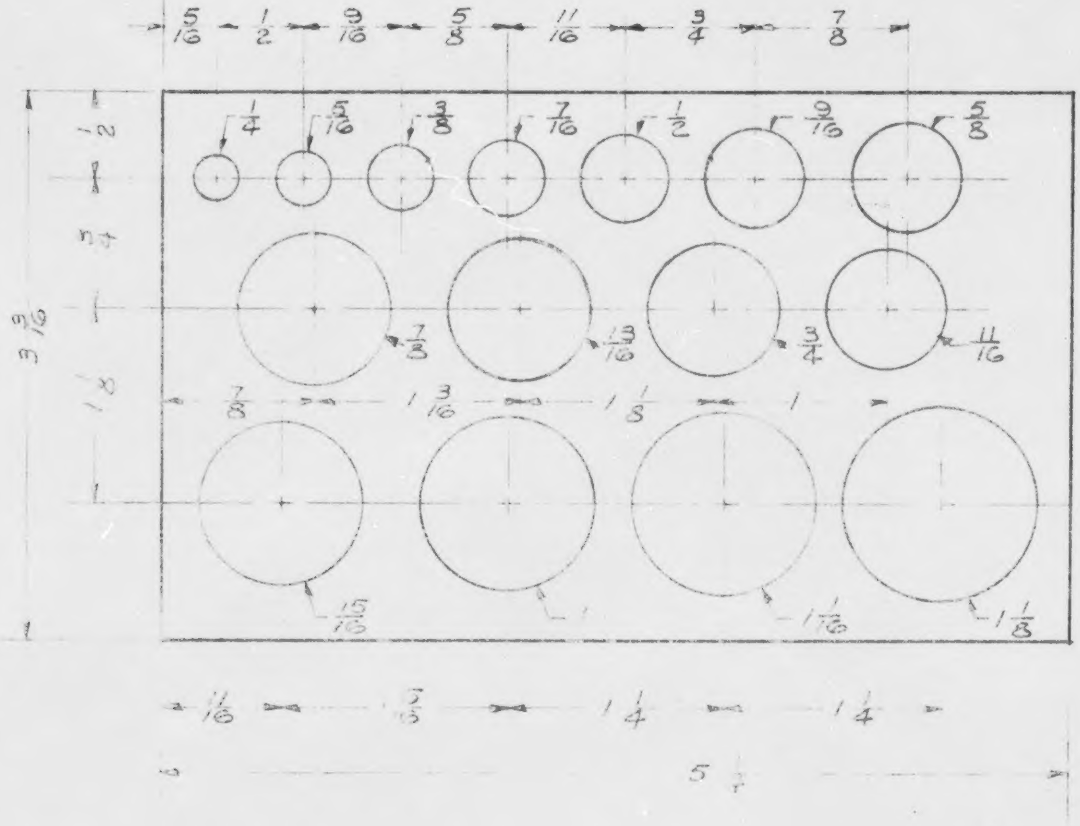


CUSHION BASE

DIRECTIONS - SCALE: 3"=1'-0

PROB # D-9

PROBLEM SHEET #D-10

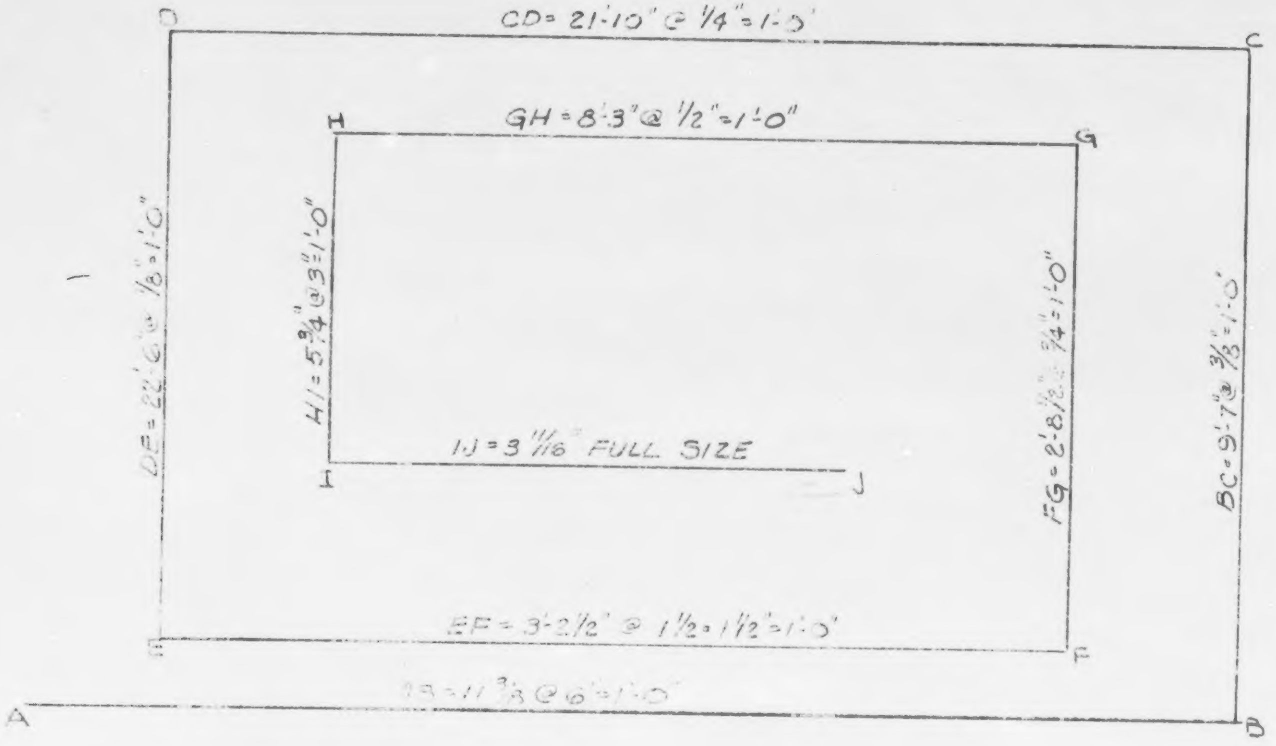


PLASTIC CIRCLE TEMPLATE

PROB-#D-10

BD Unit D Comp 4 of 4

PROBLEM SHEET #D-11


CD = 21'-10" @ 1/4" = 1'-0"
D
C
H
GH = 8'-3" @ 1/2" = 1'-0"
G
DE = 22'-6" @ 1/8" = 1'-0"
HI = 5 3/4" @ 3" = 1'-0"
IJ = 3 11/16" FULL SIZE
I
J
FG = 2'-8 1/2" @ 3/4" = 1'-0"
BC = 9'-7" @ 3/8" = 1'-0"
EF = 3'-2 1/2" @ 1 1/2 = 1 1/2" = 1'-0"
E
F
AB = 11 3/8 @ 6" = 1'-0"
A
B

SCALES

PROB D-11

QUIZ 3-Q ALPHABET OF LINES

BD Unit D Comp 4 of 4

UNIT: D Instruments and their uses

5 points each

DIRECTIONS:

Sketch each line using the proper line technique and pencil lead.

Label what lead was used on each line.

Object line

Cutting, plane line

Long, break line

Short break line

Phantom line

Hidden line

Center line

Guide lines

Section line

Dimension and extension lines.

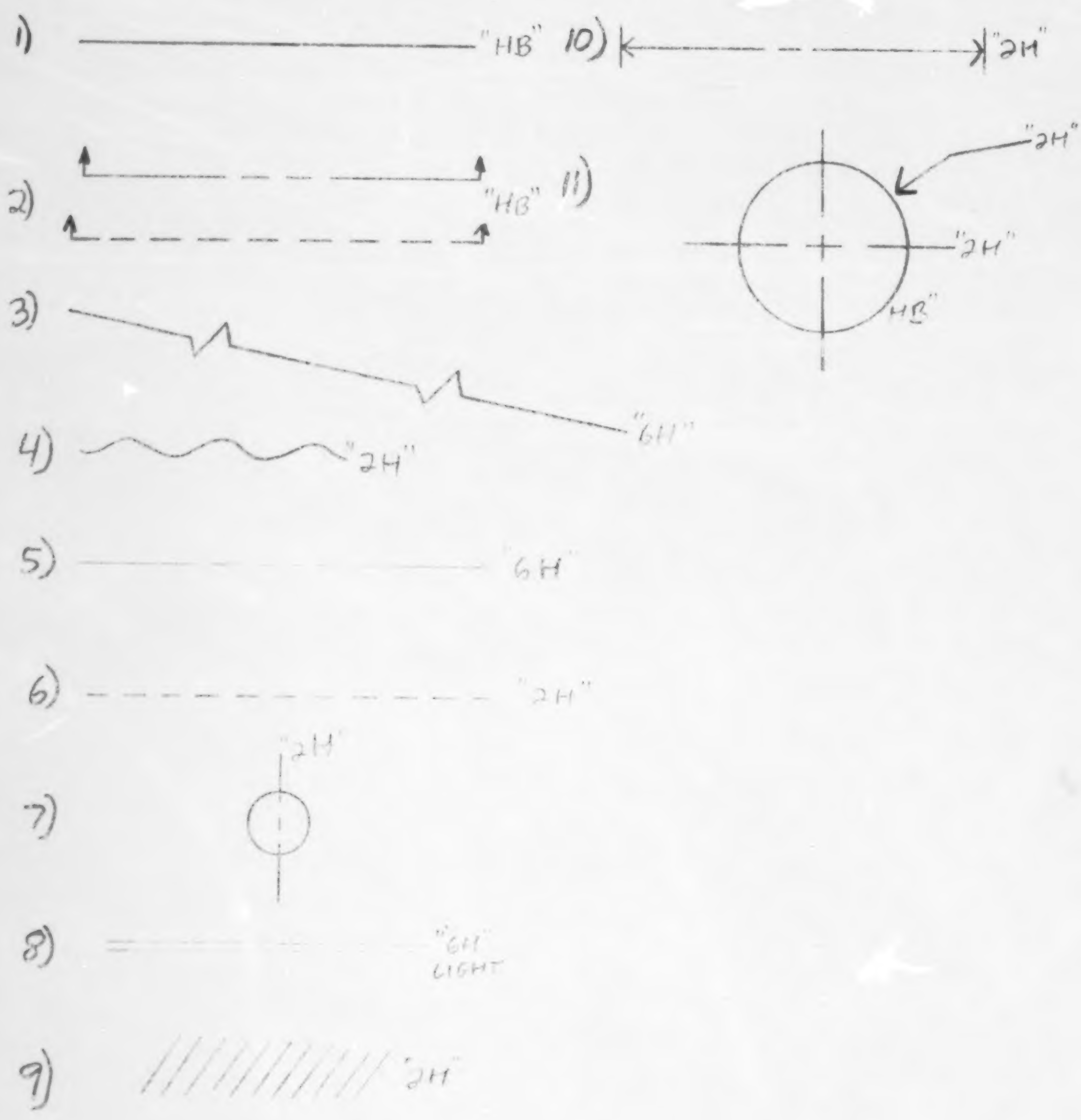
Draw a 3 1/4" diameter circle with centerlines, leader and arrows.

ANSWER SHEET #3-Q

BD Unit D Comp 4 of 4

UNIT: D Instruments and their uses

5 points each



STUDENT COMPETENCY SHEET

BD Unit E Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: E Geometric Constructions

COMPETENCY STATEMENT: Draws basic geometric constructions

PERFORMANCE OBJECTIVE: Given basic drafting tools and references, you will be able to bisect a line, bisect an angle, divide a line into equal parts, erect perpendiculars, draw parallel lines and copy given angles with 100% accuracy.

LEARNING ACTIVITIES:

1. Read Chapter 4 pages 68-76 in "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration by instructor on geometric construction.
3. Work problems on problem sheets E-1.
4. If you have problems with learning activities #1-3, ask instructor for additional help.

EVALUATION:

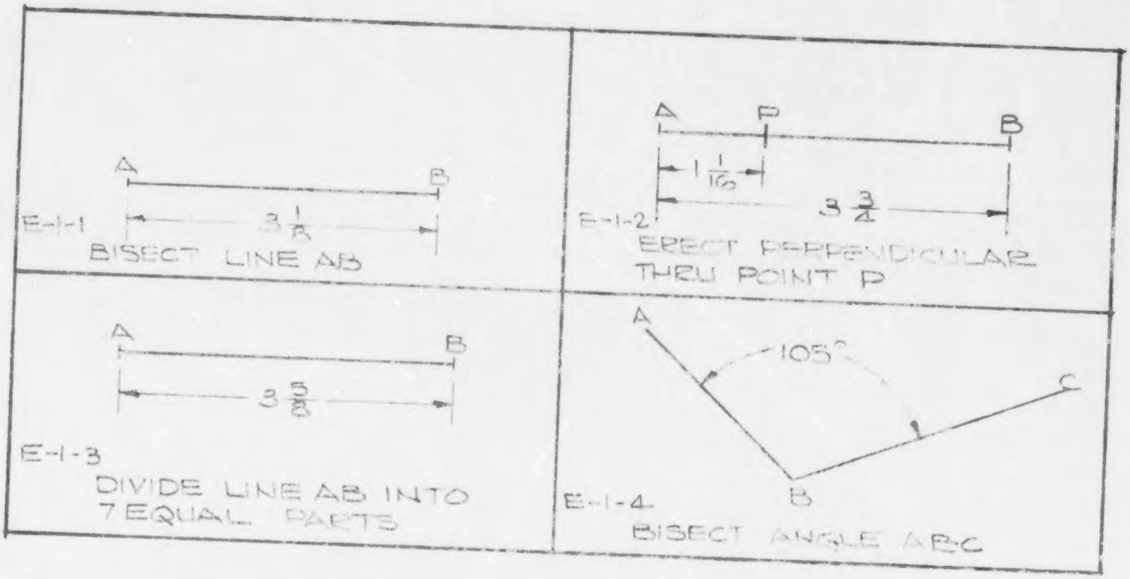
Given basic drafting tools and references, you will bisect a line, bisect a angle, bisect an arc, divide a line into equal parts, erect perpendiculars, draw parallel lines and copy given angles with 100% accuracy.

PROBLEM SHEET E-1

BD Unit E Comp 1 of 2

UNIT: E Geometric Construction

DIRECTIONS: Use a 12 x 18 sheet of paper and divide it into 4 equal blocks. Put one problem in each of the blocks.



STUDENT COMPETENCY SHEET

BD Unit E Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: E Geometric Constructions

COMPETENCY STATEMENT: Draws geometric figures

PERFORMANCE OBJECTIVE: Given basic drafting tools and references, you will be able to construct triangles, pentagons, hexagons, octagons, circle thru three points, tangents and ellipses with 100% accuracy.

LEARNING ACTIVITIES:

1. Read chapter 4 pages 76-88 in Mechanical Drawing.
2. Observe and participate in demonstration by instructor on construction of geometric figures.
3. Work problems on problem sheet #E-2.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

Given basic drafting tools and references, you will construct triangles, pentagons, hexagon, octagons, circle thru three points, tangents and ellipses with 100% accuracy.

PROBLEM SHEET #E-2

BD Unit E Comp 2 of 2

UNIT: E Geometric Construction

DIRECTIONS: Use a 12 x 18 sheet of paper and divide it into 4 equal parts.

Put one problem in each of the blocks.

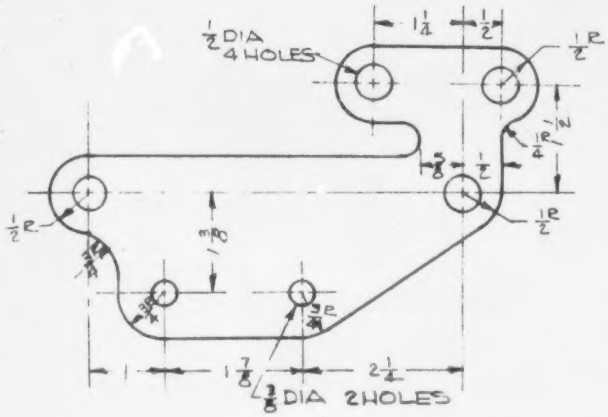
E-2-20 CONSTRUCT TRIANGLE WITH SIDES 2 1/4", 3" & 4"	E-2-21 CONSTRUCT HEXAGON WITH 3" ACROSS FLATS
E-2-22 CONSTRUCT A CIRCLE THRU ANY 3 POINTS	E-2-23 CONSTRUCT AN APPROX. ELLIPSE WITH MAJOR AXIS OF 3 1/4" & MINOR 2 3/4

PROBLEM SHEET #E-2 (CON'T)

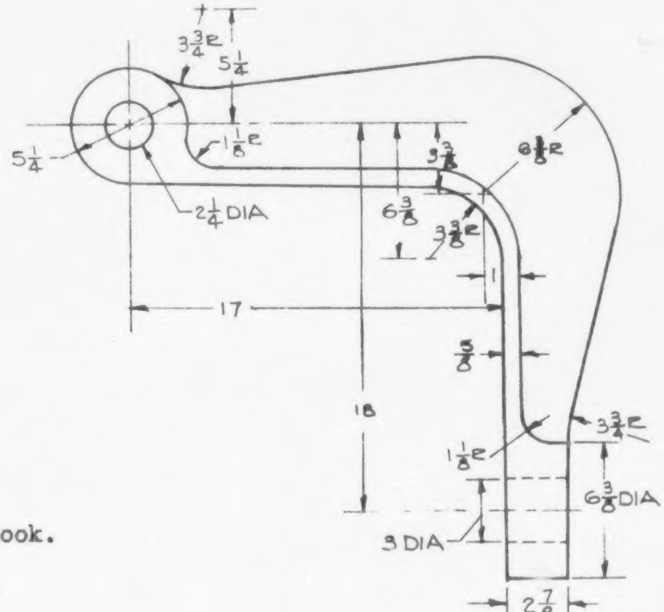
BD Unit E Comp 2 of 2

UNIT: E Geometric Construction

DIRECTIONS: Use 12 x 18 sheet of paper and put one problem on a page.



E-2-24 Draw Holding Bracket



E-2-25 Draw end loading hook.

Scale: #" = 1' 0"

STUDENT COMPETENCY SHEET

BD Unit F Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: F Basic Dimensioning

COMPETENCY STATEMENT: Know the general rules and the two different systems for placing dimensions on drawings.

PERFORMANCE OBJECTIVE: Given basic drafting tools and references, you will be able to place dimensions on your drawings using the Aligned System and Unidirectional System as illustrated on page 107-117 in "Mechanical Drawing".

LEARNING ACTIVITIES:

1. Read chapter #6 page 107-117 in "Mechanical Drawing" and be prepared to discuss.
2. Attend a demonstration, given by instructor, on general rules for Aligned and Unidirectional dimensioning systems.
3. Take written quiz 4-Q on dimensioning. Must score a minimum of 90% correct.
4. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given basic drafting tools and references, you will place dimensions on your drawing using the Aligned System and Unidirectional System as illustrated on pages 107-117 in "Mechanical Drawing".

QUIZ 4-Q

BD Unit F Comp 1 of 1

UNIT: F Basic Dimensioning

5 points each

1. Name two types of dimensioning systems.

   A.
   B.

2. Draw the 2 different cutting plane lines.
   A. B.

3. Finished or machined surfaces are indicated by what symbol?

4. Give an example of a round and fillet:
   A. B.

5. Name the two basic kinds of dimensions.
   A. B.

6. Write forty-five degrees, twenty-one minutes and thirty seconds, using proper symbols.

7. T. or F. Is it a general rule to place dimensions inside the view?

8. T. or F. Extension lines are thin lines drawn from the outline and extending approximately 1/8" past the arrowhead.

9. T. or F. Extension lines should not touch the object.

10. T. or F. Always give the radius of a circle, not the diameter.

11. T. or F. On machine drawings, detail dimensions up to 72 inches should be given in inches.

12. T. or F. Most dimensions should be placed on the view that tells little about the object.

13. T. or F. When the dimensions are all in inches, the inch marks must be placed on the drawing.

14. T. or F. Dimension lines should be spaced about 1/4" apart and about 3/8" from the outline of the view.

15. T. or F. Dimension lines may cross each other.

16. T. or F. Section lines are 1/4" apart.

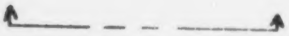
ANSWER SHEET 4-Q

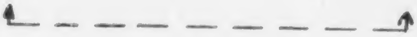
BD Unit F Comp 1 of 1

UNIT: F Basic Dimensioning
5 points each

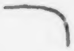
1. a. aligned

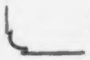
   b. unidirectionsl

2. a. 

   b. 

3. V

4. a.  round

   b.  fillet

5. a. size

   b. location

6. 45° 21' 30"

7. False

8. True

9. True

10. False

11. True

12. False

13. False

14. True

15. False

16. False

STUDENT COMPETENCY SHEET

BD Unit G Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: G Orthographic projection

COMPETENCY STATEMENT: Determine and draw necessary views to completely describe the shape of an given object.

PERFORMANCE OBJECTIVE: Given the basic drafting tools and references, you will be able to draw the necessary views to describe the shape of a given series of complex objects as illustrated on pages 89-101 "Mechanical Drawing" with 100% accuracy.

LEARNING ACTIVITIES:

1. Read chapter #5 pages 89-101 in "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration given by the instructor on orthographic projection.
3. Work problems on problem sheets G-1 to G-7.
4. Take written quiz #5-Q on Orthographic Projection. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

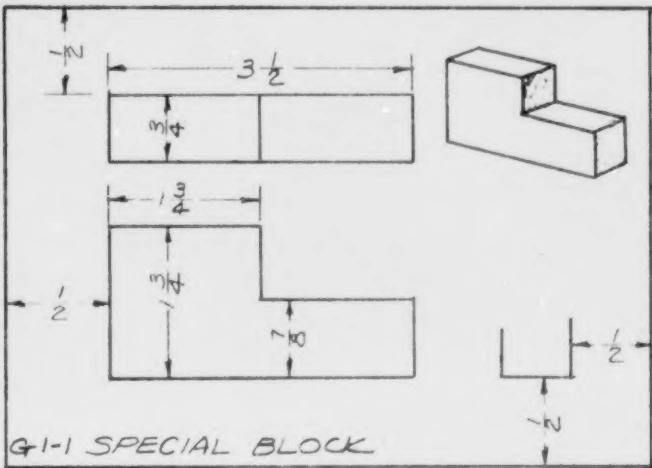
Given basic drafting tools and references, you will draw the necessary views to describe the shape of a given series of complex objects as illustrated on pages 89-101 in "Mechanical Drawing" with 100% accuracy.

PROBLEM SHEET #G-1

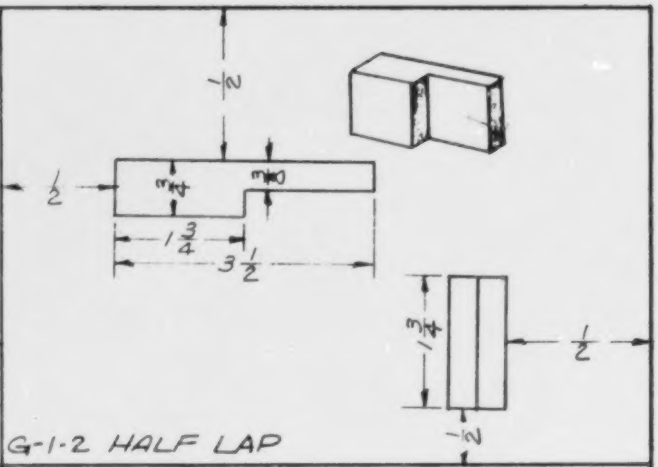
BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

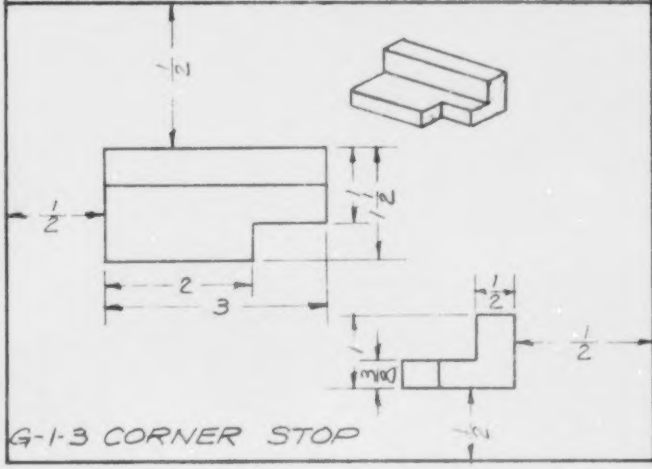
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 4 equal blocks. Place one problem in each block. Draw the necessary views of each problem and dimension correctly.



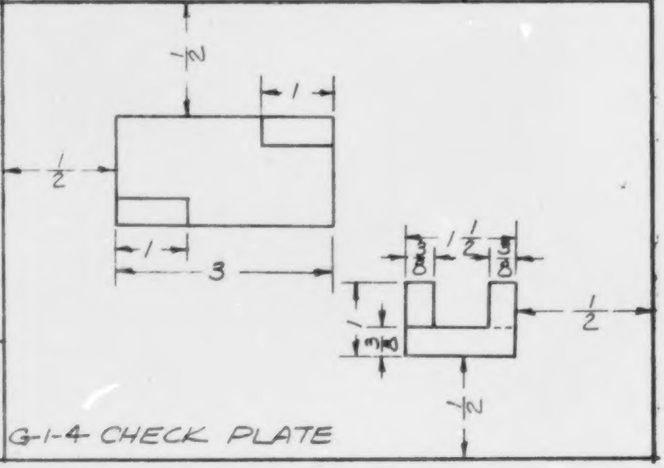
G-1-1 SPECIAL BLOCK



G-1-2 HALF LAP



G-1-3 CORNER STOP



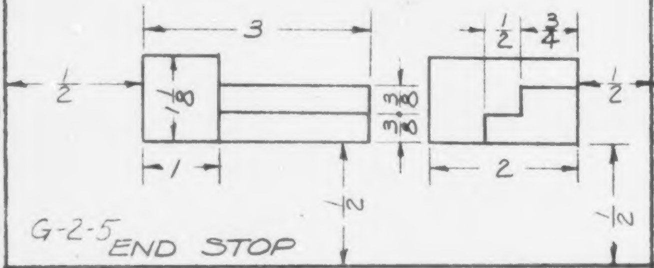
G-1-4 CHECK PLATE

PROBLEM SHEET # G-2

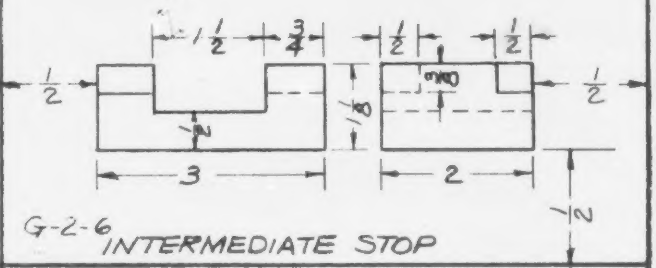
BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

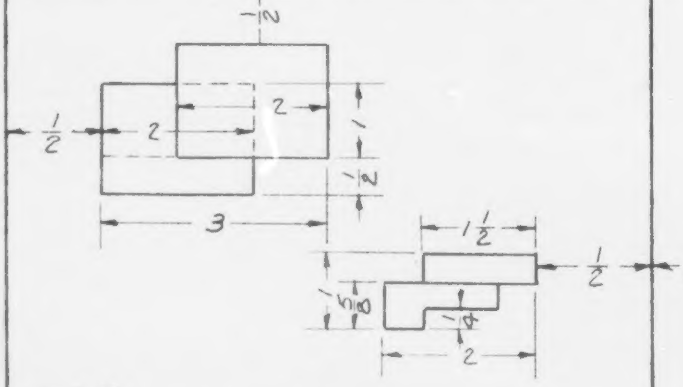
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 4 equal blocks. Place one problem in each block. Draw the necessary views of each problem and dimension correctly.



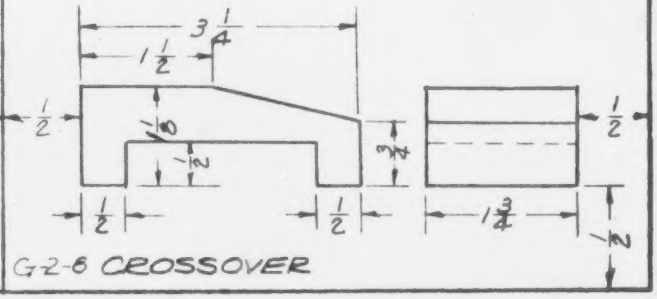
G-2-5 END STOP



G-2-6 INTERMEDIATE STOP



G-2-7 LOCATING SLIDE



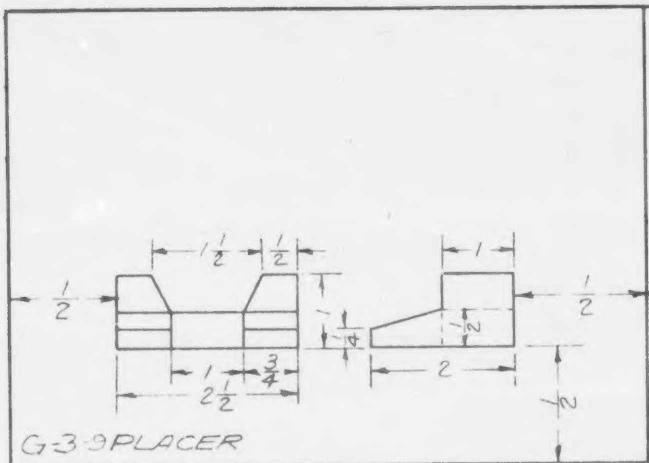
G-2-8 CROSSOVER

PROBLEM SHEET # G-3

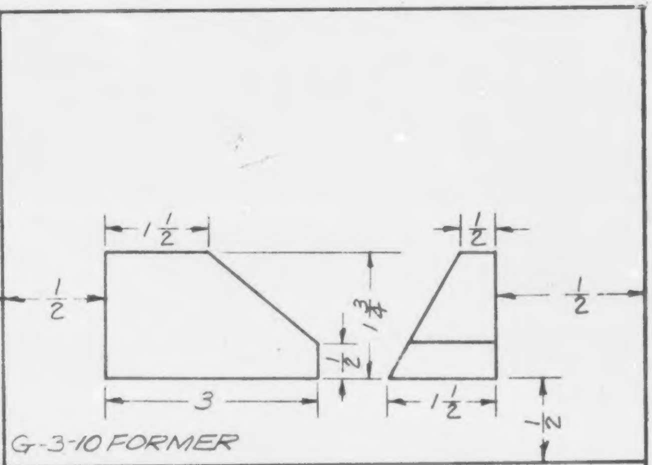
BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

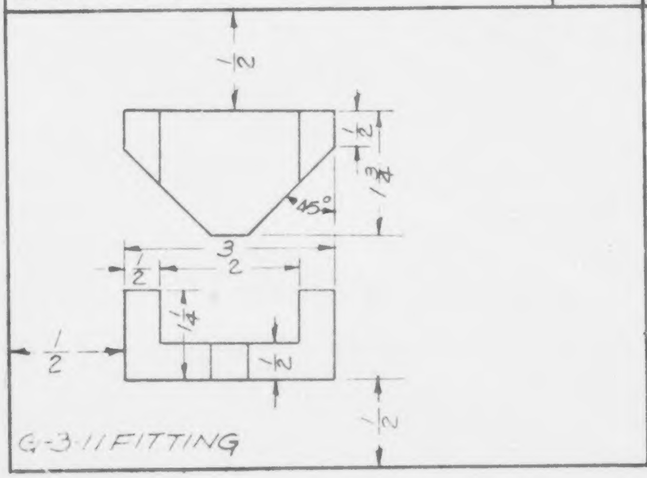
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 4 equal blocks. Place one problem in each block. Draw the necessary views of each problem and dimension correctly.



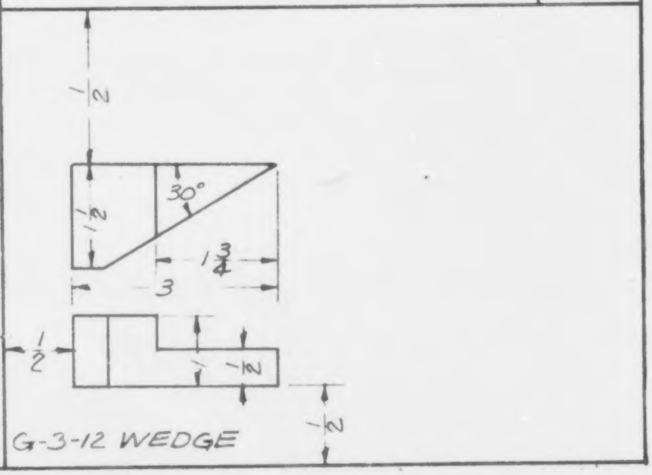
G-3-9 PLACER



G-3-10 FORMER



G-3-11 FITTING



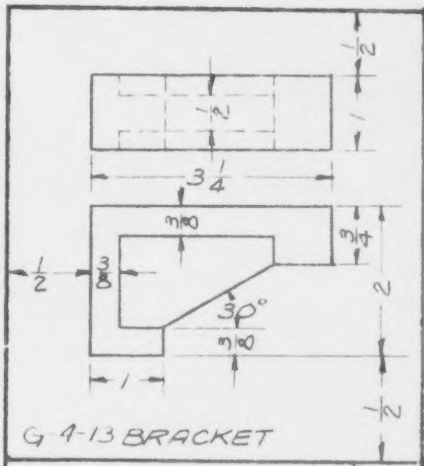
G-3-12 WEDGE

PROBLEM SHEET #G-4

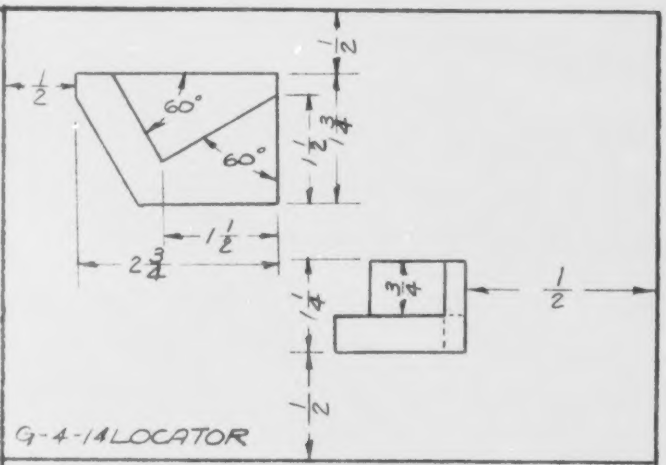
BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

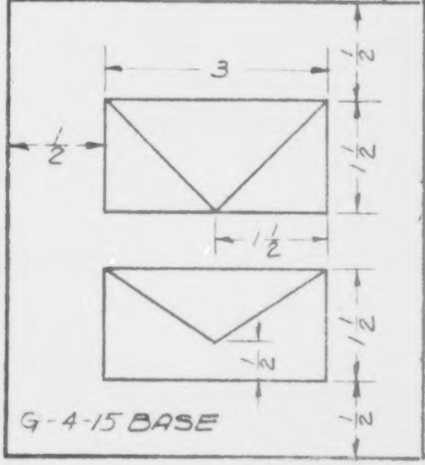
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 4 equal blocks. Place one problem in each block. Draw the necessary views of each problem and dimension correctly.



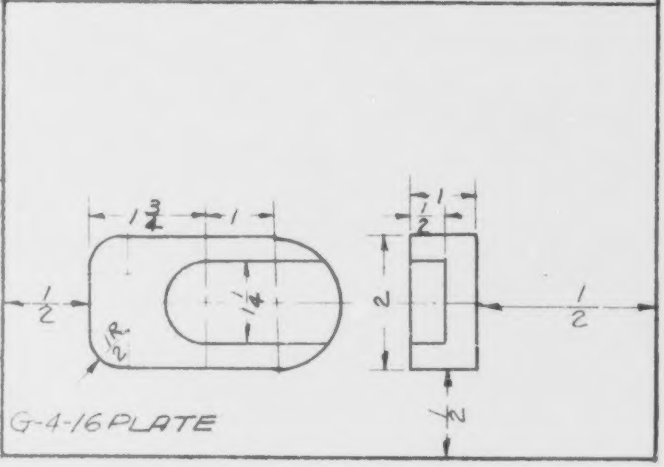
G-4-13 BRACKET



G-4-14 LOCATOR



G-4-15 BASE



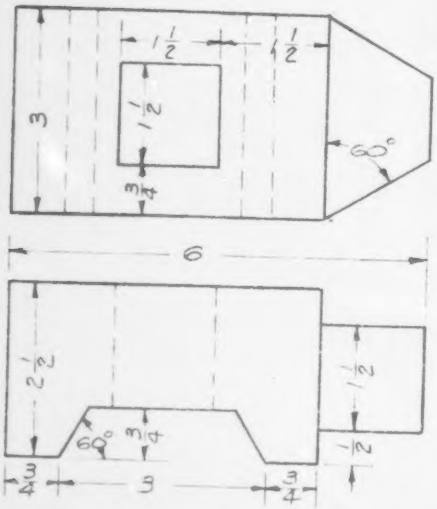
G-4-16 PLATE

PROBLEM SHEET #G-5

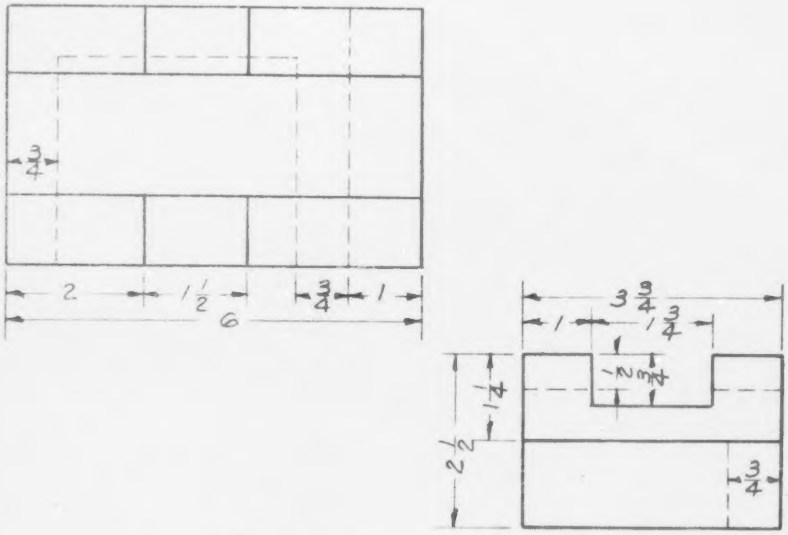
BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

DIRECTIONS: Use 12 x 18 sheet of drawing paper and place one problem on a sheet. Choose the necessary views and dimension correctly. Center each problem equally in working space.



G·5·10 LOCATING SUPPORT



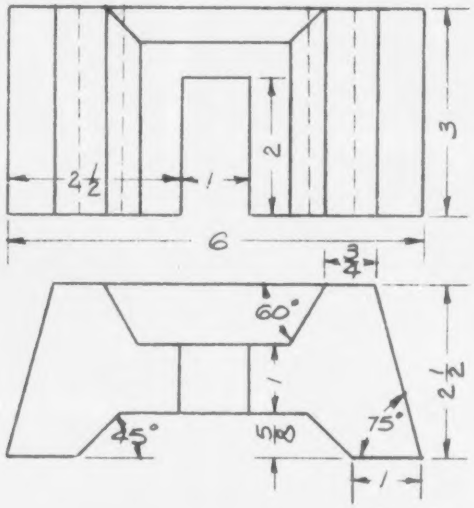
G·5·11 SLOTTED BRACKET

PROBLEM SHEET #G-6

BD Unit G Comp 1 of 1

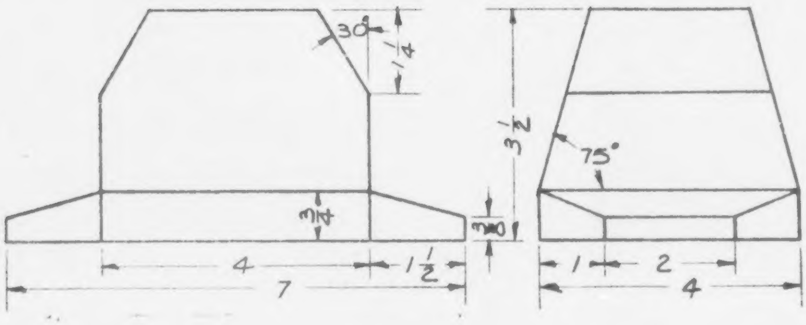
UNIT: G Orthographic Projection

DIRECTIONS: Use 12 x 18 sheet of drawing paper and place one problem on a sheet. Choose the necessary views and dimension correctly. Center each problem equally in working space.



G-6-12

BASE



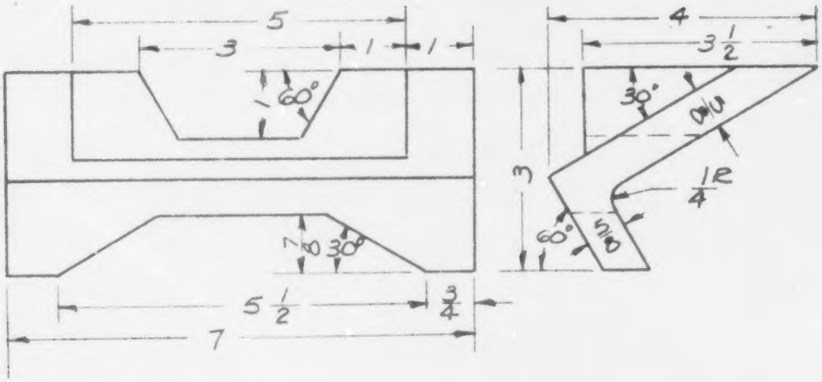
G-6-13 MAIN BLOCK

PROBLEM SHEET #G-7

BD Unit G Comp 1 of 1

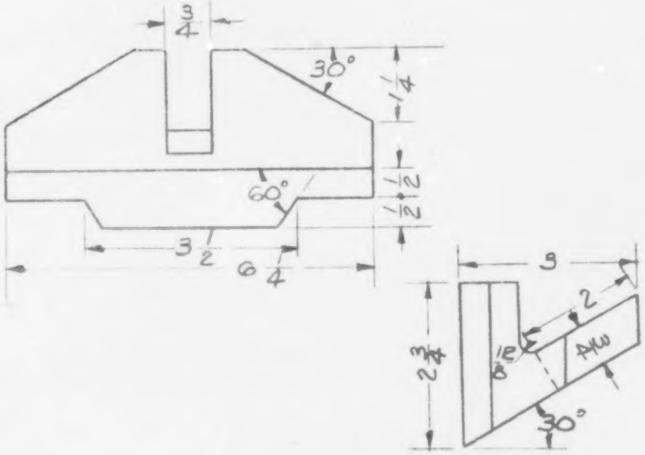
UNIT: G Orthographic Projection

DIRECTIONS: Use 12 x 18 sheet of drawing paper and place one problem on a sheet. Choose the necessary views and dimension correctly.



G-6-14 SEPARATOR

DIRECTIONS: Center each problem in center of working space.



G·6·15 SECONDARY GUIDE LUG

QUIZ SHEET 5-Q

BD Unit G Comp 1 of 1

UNIT: G Orthographic Projection

5 Points each

1. Why are some objects drawn with only two views shown?
2. Which views show depth of an object?__________and ____________
3. What are the 3 views of an object that are most commonly drawn?
    1. _____________________________
    2. _____________________________
    3. _____________________________
4. How many views may an rectangle have? _____________List each view.
5. What view is directly above the front view? ____________________
6. What view is to the right of the front view?
7. Do the front and back view show the same information?
8. What measurements do the front view show?
9. What measurements do the top view show?
10. What measurements do the right side view show?
11. When a hidden line and a center line coincide, which line would you show? __________________________________
12. When a visible line and a hidden line coincide, which line would you show? _________________________________

ANSWER SHEET #5-Q

BD Unit G Comp 1 of 1

UNIT: G Orthographic projection
5 points each

1. Because two views show everything needed. Such as round; square; tapered; simple rectangular objects, etc.
2. a. front

   b. side
3. a. top

   b. front

   c. right side
4. a. six

   b. top

   c. front

   d. back

   e. right side

   f. left side

   g. bottom
5. top
6. right side
7. true
8. length and height
9. length and width
10. width and height
11. hidden line
12. visible line

STUDENT COMPETENCY SHEET

BD Unit H Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: H Pictorial Drawing

COMPETENCY STATEMENT: Demonstrates knowledge of Isometric, Oblique, Cavilier and Cabinet drawing.

PERFORMANCE OBJECTIVE: Given basic drafting tools, a quiz and references, you will be able to draw the necessary Isometric, Oblique, Cavilier and Cabinet drawing with 100% accuracy. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 12 pages 230-243 "Mechanical Drawing", and be prepared to discuss.
2. Attend and participate in demonstration on Isometrics, Oblique, Cavilier and Cabinet drawings.
3. Read directions and work problems on problem sheets #H-1, H-2, and H-3 in "Mechanical Drawing".
4. Take a written quiz 6-Q on Isometrics, Obliques, Cavilier or Cabinet Drawings. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

BD Unit H Comp 1 of 2

EVALUATION:

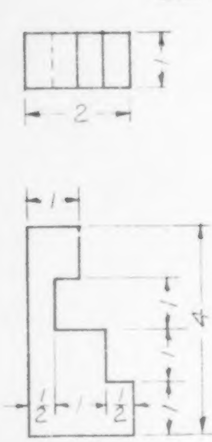
Given basic drafting tools, a quiz and references, you will draw the necessary Isometric, Oblique, Cavilier and Cabinet drawings with 100% accuracy. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #H-1

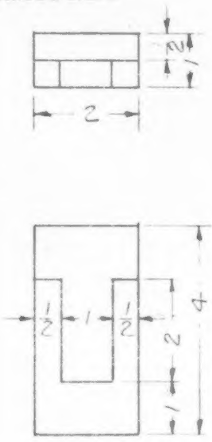
BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

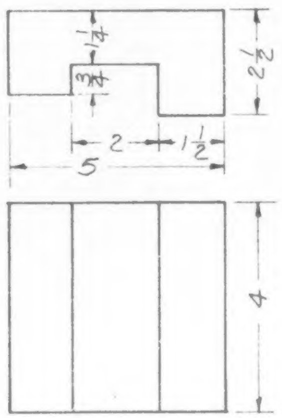
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide into 2 equal parts. Draw the isometric view of the following items and dimensions correctly.



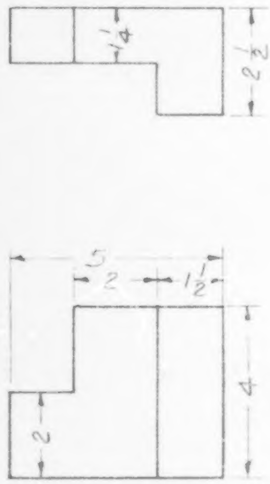
PROBLEM # H-1-10



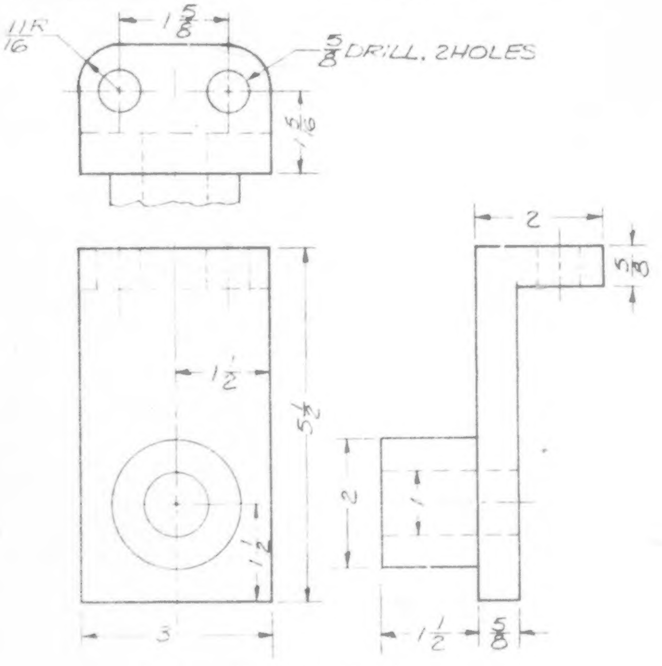
PROBLEM # H-1-11



PROBLEM # H-1-12



PROBLEM # H-1-18



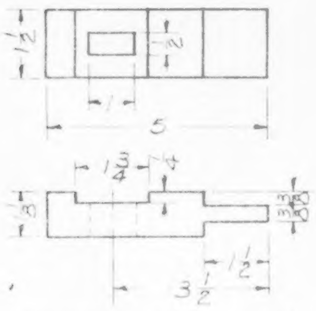
PROBLEM # H-1-14

PROBLEM SHEET #H-2

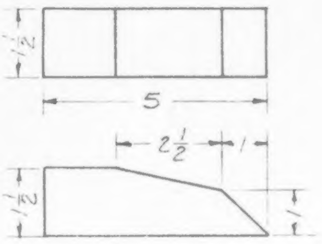
BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

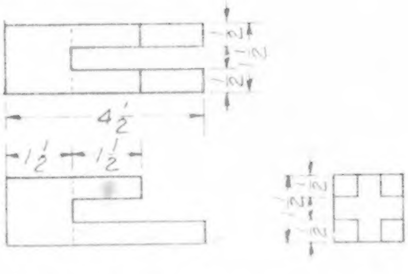
DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide into 2 equal parts. Draw the isometric view of the following items and dimensions correctly.



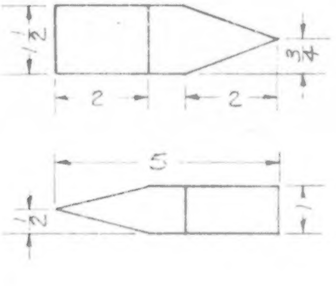
PROBLEM # H-2-20



PROBLEM #H-2-21



PROBLEM # H-2-23



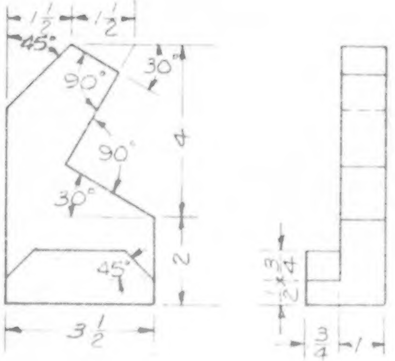
PROBLEM #H-2-22

PROBLEM SHEET #H-2

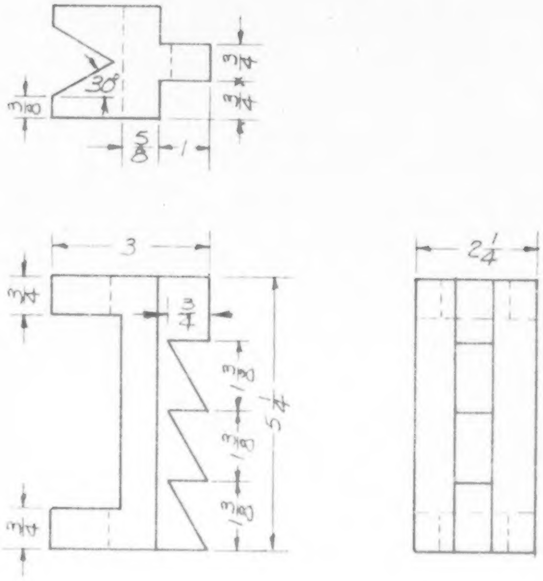
BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide into 2 equal parts. Draw the isometric view of the following items and dimensions correctly.



PROBLEM # H-2-24



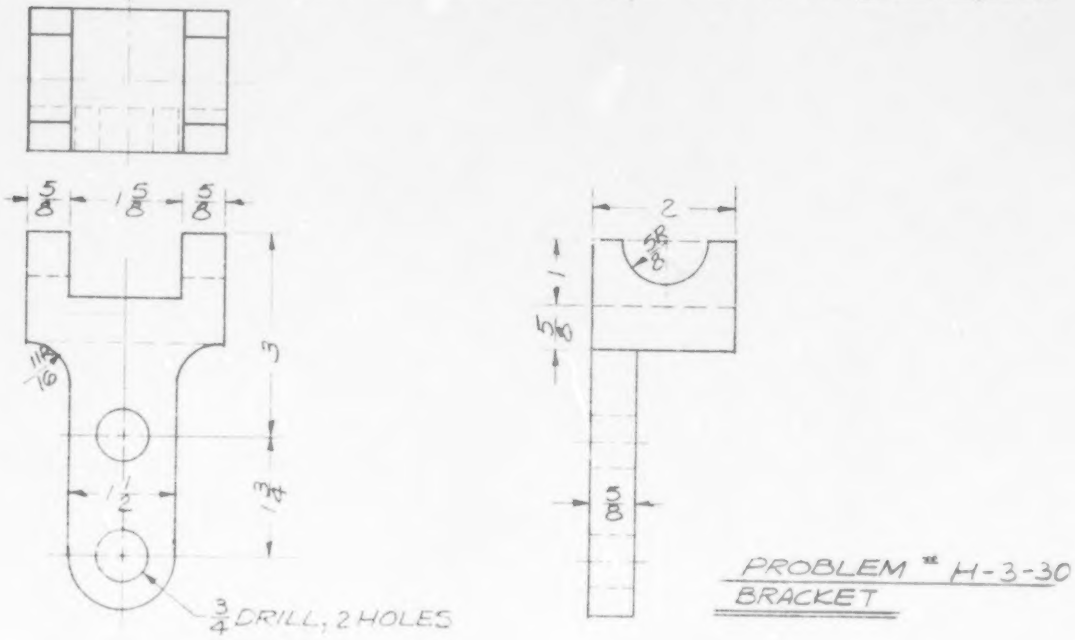
PROBLEM # H-2-25

PROBLEM SHEET #H-3

BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 2 equal parts. Draw the isometric view of each of the given objects.



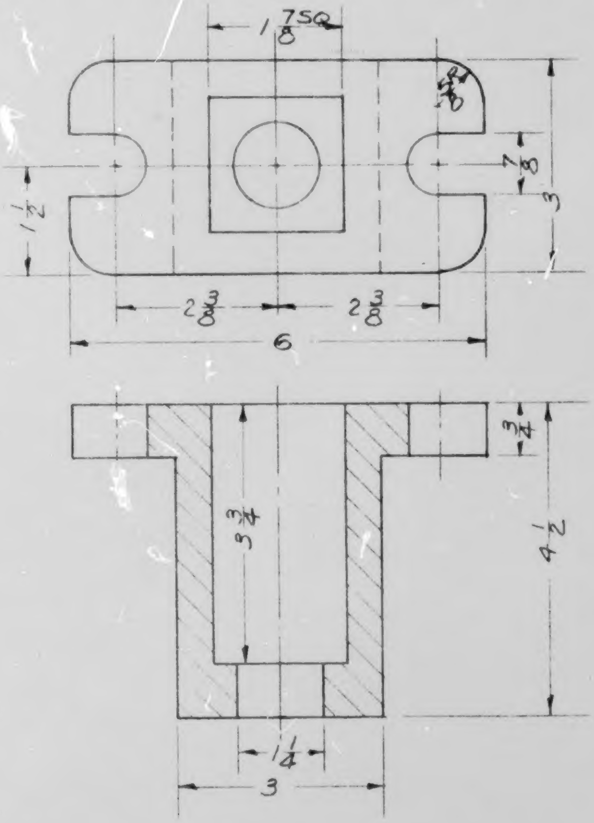
PROBLEM SHEET #H-3

BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide it into 2 equal parts. Draw the isometric view of each of the given objects.

DIRECTIONS: Draw 1/2 sections of each of the following objects.



PROBLEM #H 3-31
POST-SOCKET

STUDENT COMPETENCY SHEET

BD Unit H Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: H Pictorial Drawing

COMPETENCY STATEMENT: Demonstrate Knowledge of one and two point perspectives.

PERFORMANCE OBJECTIVE: Given basic drafting tools and references and you will be able to draw one and two point perspectives with 100% accuracy. The drawing must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 12, pages 244-251 in "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on one and two point perspectives.
3. Read directions and work problems on problem sheet H-4.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

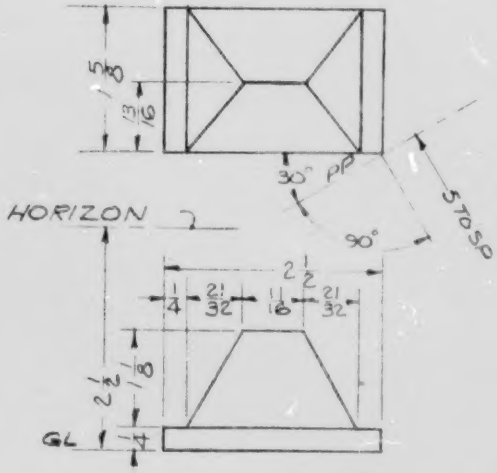
Given basic drafting tools and references you will draw one and two point perspectives with 100% accuracy. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #H-4

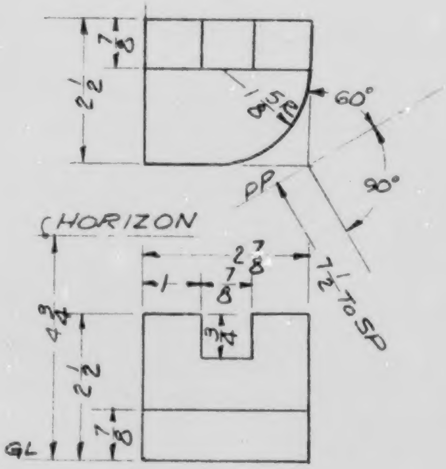
BD Unit H Comp 2 of 2

UNIT: H Pictorial Drawings

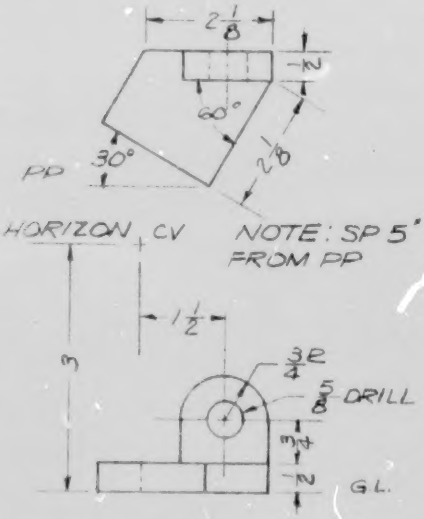
DIRECTIONS: Use 18 x 24 sheet of tracing paper and draw the given views and the required perspective.



H-4-40 Double Wedge Block



H-4-41 Notched Holder



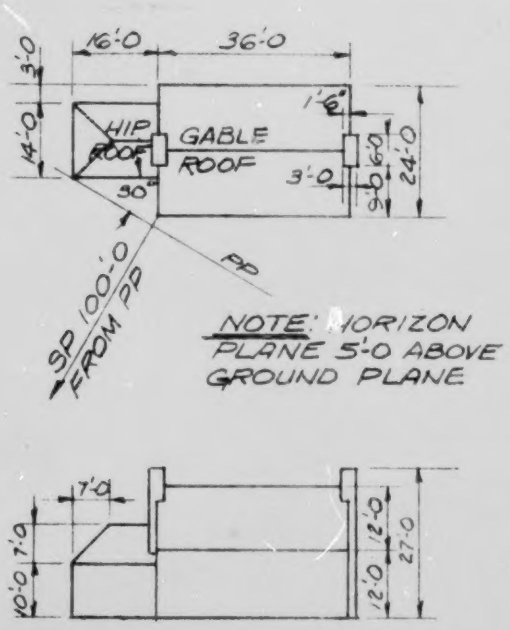
H-4-42 Corner Lug

PROBLEM SHEET #H-4

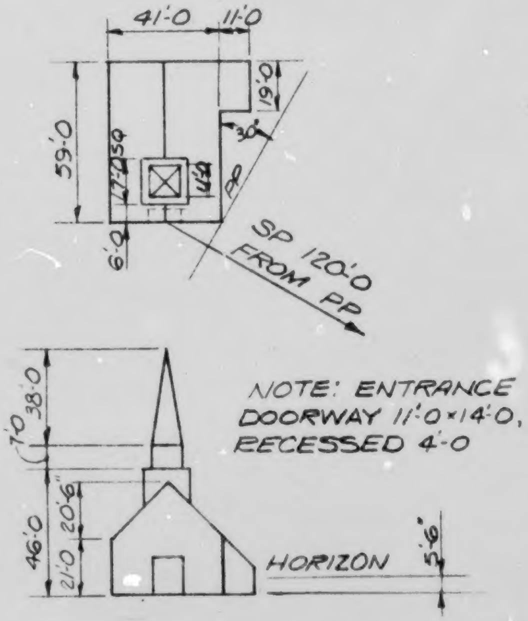
BD Unit H Comp 2 of 2

UNIT: H Pictorial Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and draw the given views and the required perspective.



H-4-43 House
Scale 3/32"=1'-0



H-4-44 Church
Scale 1/16"=1'-0

QUIZ 6-Q

BD Unit H Comp 1 of 2

UNIT: H Pictorial Drawing

5 points each

1. When one picture is placed with its surface parallel to the picture plane instead of an angle it is called an ____________ ____________.

2. Name 5 different types of pictorial drawings.
   A.
   B.
   C.
   D.
   E.

3. T F Circles appear as ellipses in isometric drawings.

4. T F Lines not parallel to any of the isometric axes are called nonisometric lines.

5. T F Angles on isometric drawings are true size and can be measured in degrees.

6. What are the 2 most common types of sectional views used in pictorial drawings?
   A.
   B.

7. To illustrate how a group of parts are to be put together an _______ drawing is used.

8. Name 3 types of axonometric projection.
   A.
   B.
   C.

9. Cabinet drawings are drawn the same as oblique drawings except the receding axis is ________ as long as the normal oblique axis.

10. The purpose of pictorial drawings is to ______ _______ ______ _____.

11. Irregular curves in an isometric drawing must be drawn by _________ _________.

QUIZ 6-Q

BD Unit H Comp 1 of 2

12. To represent a part as viewed from below you ________ ________.

13. The pictorial drawing that looks like a photograph is ________.

ANSWER SHEET 6-Q

BD Unit H Comp 1 of 2

UNIT: H Pictoral Drawing

5 points each

1. oblique drawing
2. a. perspective
   b. isometric
   c. cabinet
   d. oblique
   e. cavalier
   f. exploded assembly drawings
3. True
4. True
5. False
6. full section, half section
7. exploded
8. a. axonometric
   b. dimetric
   c. trimetric
9. hall
10. show objects as they appear
11. platting paints
12. reverse the axes
13. a perspective

STUDENT COMPETENCY SHEET

BD Unit I Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: I Auxiliaries

COMPETENCY STATEMENT: Draw necessary auxiliary views.

PERFORMANCE OBJECTIVE: Given basic drafting tools, references and a quiz, you will be able to describe auxiliary views with 90% accuracy according to standards set in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter #7 pages 137-143 "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on auxiliary views.
3. Read directions and work problems on problem sheets #I-1, I-2 and I-3.
4. Take written quiz 7-Q on auxiliaries. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

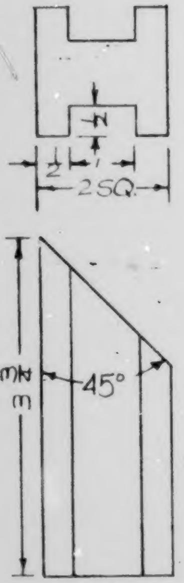
Given basic drafting tools, references and a quiz, you will describe auxiliary views with 90% accuracy according to standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #I-1

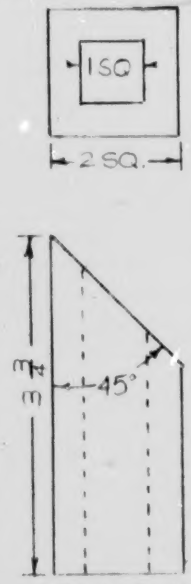
BD Unit I Comp 1 of 1

UNIT: I Auxiliaries and Revolutions

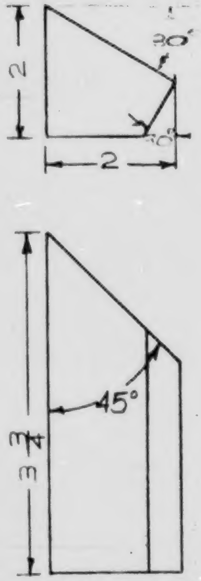
DIRECTIONS: Use standard 12 x 18 sheet of drawing paper and divide it into two equal parts. Copy given views and draw auxiliary view.



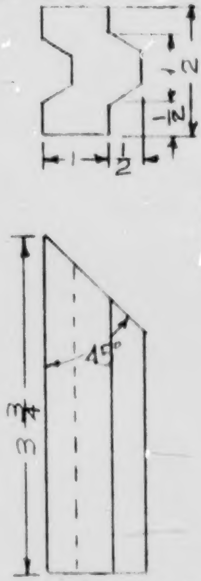
PROB. I-1-10



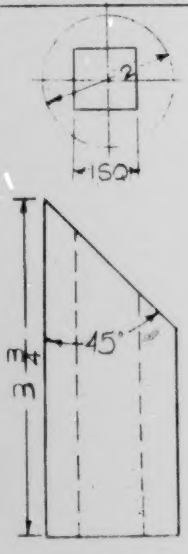
PROB. I-1-11



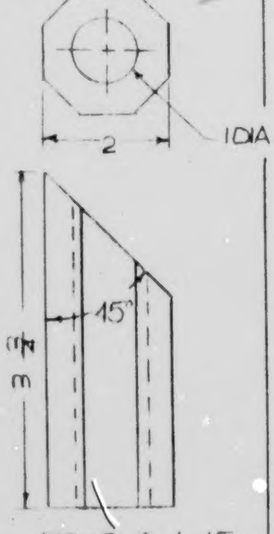
PROB. I-1-12



PROB. I-1-13



PROB. I-1-14



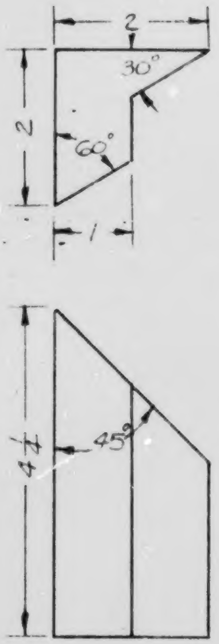
PROB. I-1-15

PROBLEM SHEET #I-2

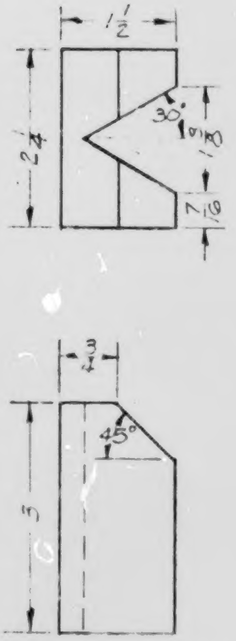
BD Unit I Comp 1 of 1

UNIT: I Auxiliaries and Revolutions

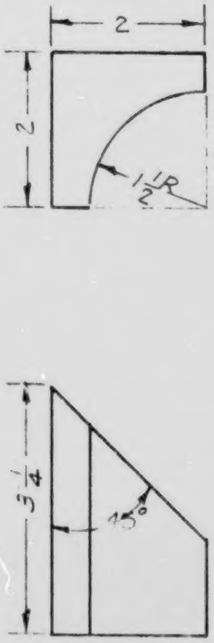
DIRECTIONS: Use standard 12 x 18 sheet of drawing paper and divide it into two equal parts. Copy given views and draw auxiliary view.



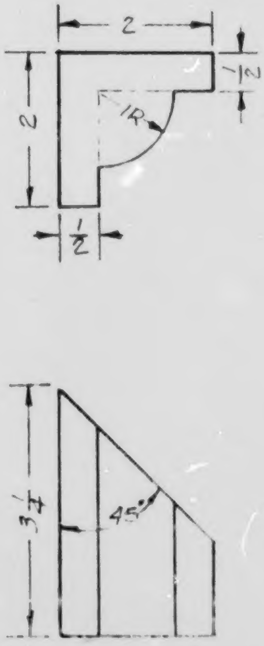
PROB. I-2-20



PROB. I-2-21



PROB. I-2-22



PROB. I-2-23

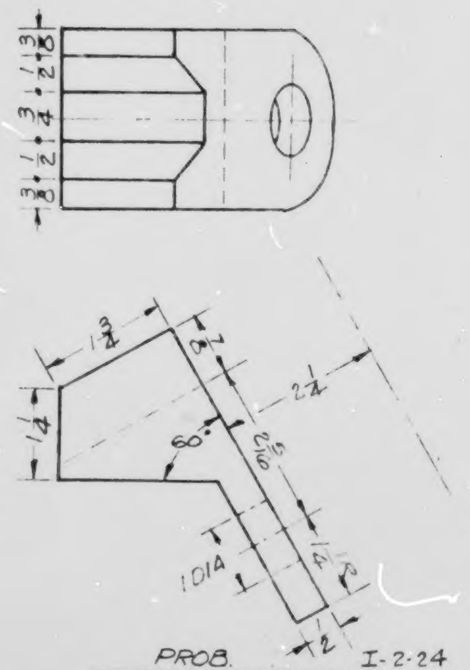
PROBLEM SHEET I-2 (CON'T)

BD Unit I Comp 1 of 1

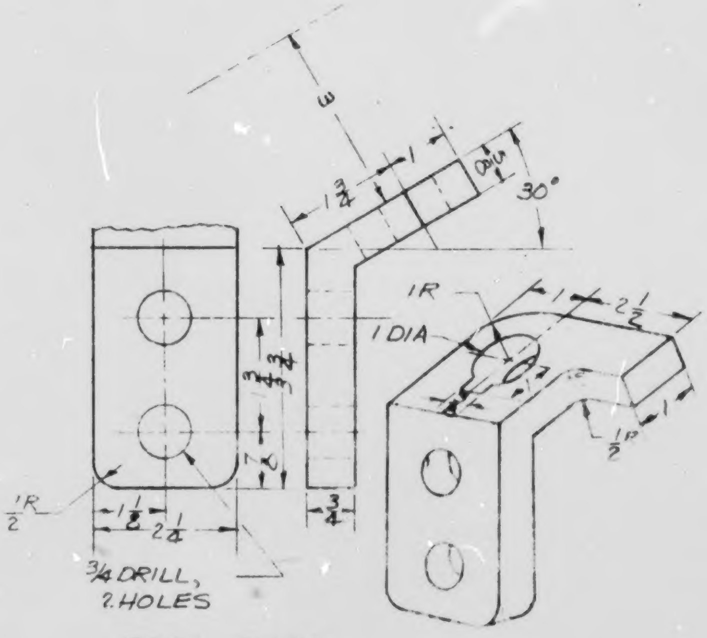
UNIT: I Auxiliaries and Revolutions

DIRECTIONS:

Use standard 12 x 18 sheet of drawing paper and divide it into two equal parts. Copy given views and draw auxiliary view.



PROB. I-2-24



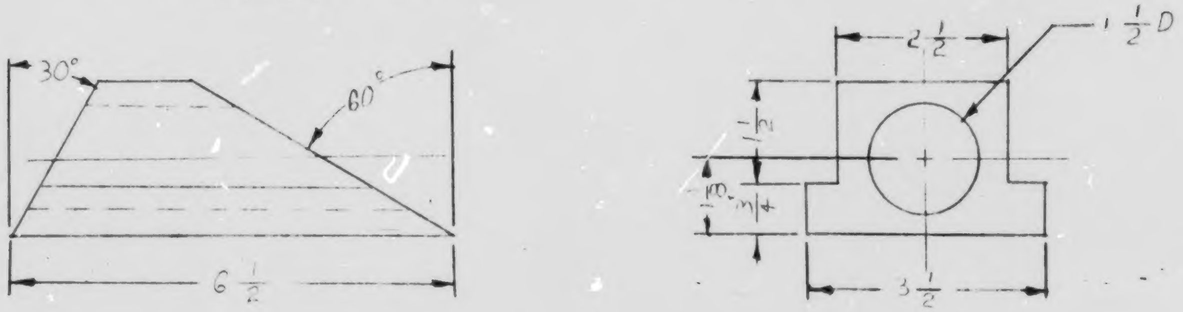
PROB. I-2-25

PROBLEM SHEET #I-3

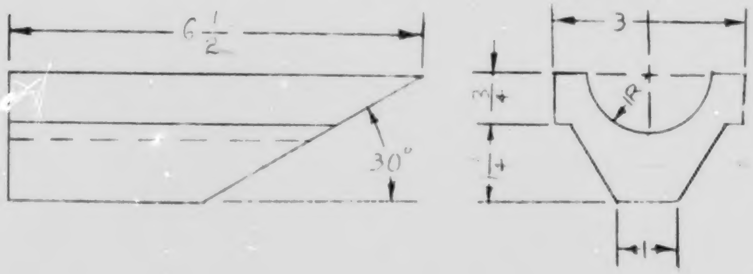
BD Unit I Comp 1 of 1

UNIT: I Auxiliaries and Revolutions

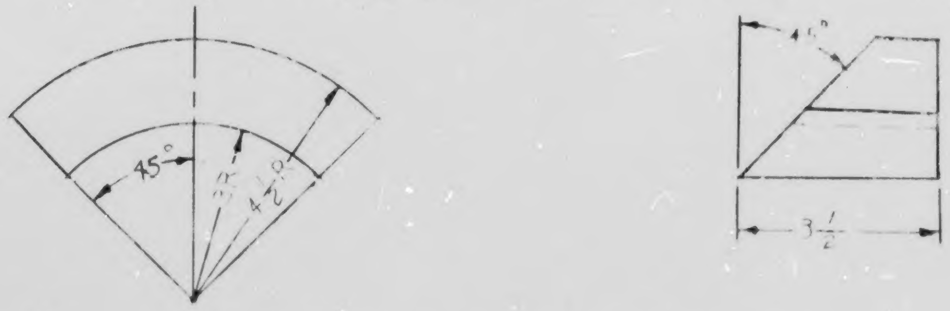
DIRECTIONS: Use full sheet of 12 x 18 drawing paper for each of the following problems.



PROB I-3-30 HOLLOW MOLDING



PROB. I-3-31 MOLDING



PROB. I-3-32 SADDLE

QUIZ SHEET 7-Q

BD Unit I Comp 1 of 1

UNIT: I Auxiliaries and Revolutions

5 points each

1. Auxiliary views are used as ____________________ views.

2. An auxiliary plane is one looking directly at the slanting surface in a direction ____________________ to it.

3. List three primary auxiliary projections.

   a.

   b.

   c.

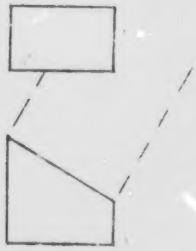
4. T F Auxiliary views describe shapes of inclined features.

5. T F The front view is called a frontal plane.

6. T F Auxiliary views of curved outlines are obtained by locating a number of points on the curves.

Sketch the missing auxiliary view for each of the following:

1



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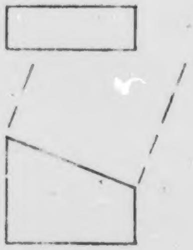

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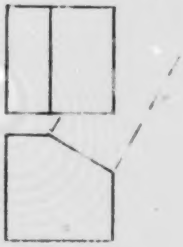


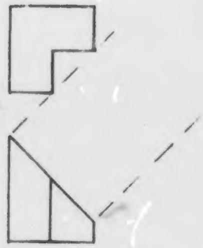
QUIZ SHEET 7-Q

BD Unit I Comp 1 of 1

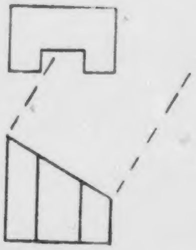
UNIT: I Auxiliaries and Revolutions

POINTS: 5 each

4



5



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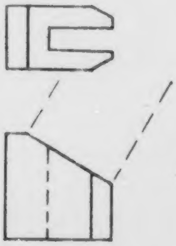

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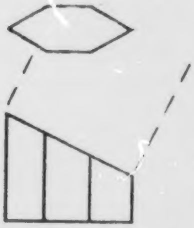

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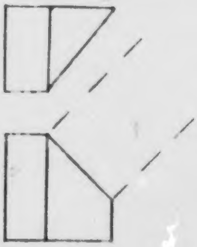

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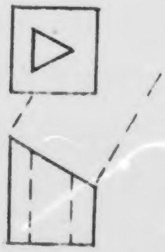

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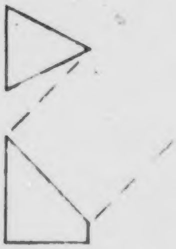

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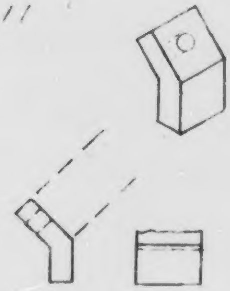

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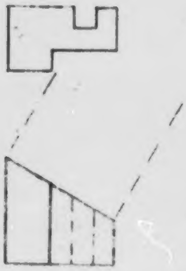


ANSWER SHEET 7-Q

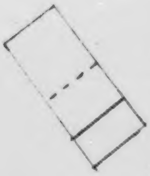
BD Unit I Comp 1 of 1

UNIT: I Auxiliaries and Revolutions

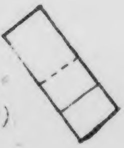
5 points each

1. helper
2. perpendicular
3. a. front auxiliary
   b. top auxiliary
   c. right-side auxiliary
4. True
5. True
6. True

1)



2)



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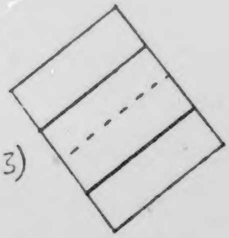

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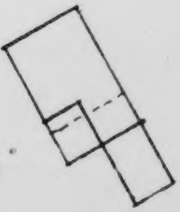

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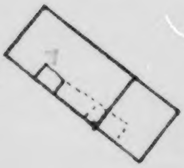

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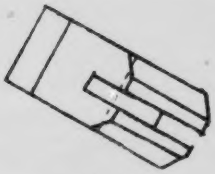

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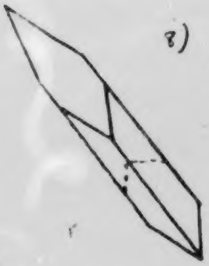

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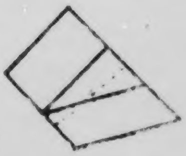

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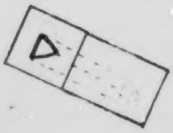

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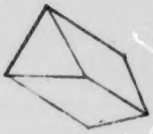

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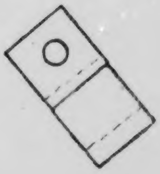

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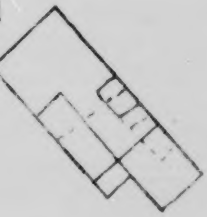


STUDENT COMPETENCY SHEET

BD Unit J Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: J Revolutions

COMPETENCY STATEMENT: Demonstrate use of revolutions

PERFORMANCE OBJECTIVE: Given basic drafting tools, references and a quiz, you will be able to demonstrate your knowledge of Revolutions by answering 90% of the questions correctly on the quiz according to standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter #7 pages 143-149 "Mechanical Drawing" and be prepared to discuss.
2. Read directions and work problems on problem sheets J-1.
3. Take written quiz 8-Q on revolutions. Must score a minimum of 90% correct.
4. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

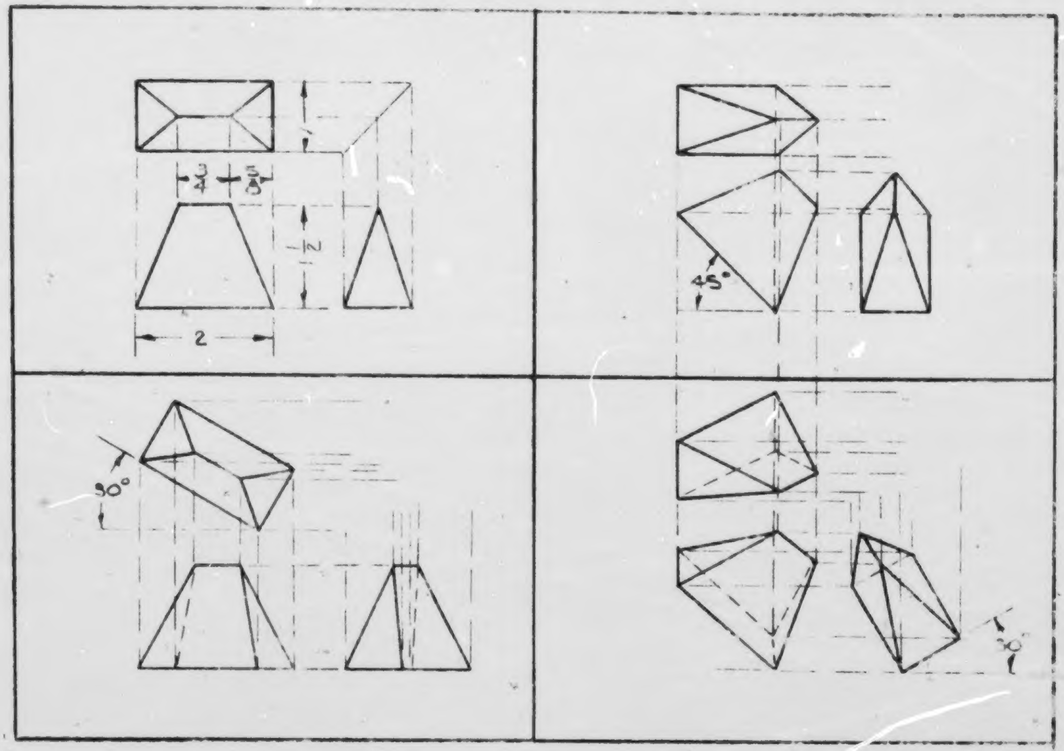
Given basic drafting tools, no references and a quiz, you will demonstrate your knowledge of Revolutions by answering 90% of the questions correctly on the quiz according to standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #J-1

BD Unit J Comp 1 of 1

UNIT: J Revolutions

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide into 4 equal parts.



7.10 Redraw figure to become familiar with the proper procedure to revolve an given object.

QUIZ SHEET 8-Q

BD Unit J Comp 1 of 1

UNIT: J Revolutions

20 points each

1. What auxiliary projection is used for finding the true size of an oblique surface?

2. What is the basic reason for revolving the view of an object?

3. What is meant by the axis of Revolution?

4. T F A surface will show in its true shape when it is parallel to a plane.

5. T F A revolved view is needed to check the space for operation or to find a particular true length of a shape.

ANSWER SHEET 8-Q

BD Unit J Comp 1 of 1

UNIT: J Revolutions

20 points each

1. Successive Revolutions
2. Obtain true size and shape of inclined surfaces.
3. Axis of Revolution is taken perpendicular to the vertical, horizontal or profile plane.
4. True
5. True

STUDENT COMPETENCY SHEET

BD Unit K Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: K Inking

COMPETENCY STATEMENT: Demonstrate ability to draw with ink.

PERFORMANCE OBJECTIVE: Given basic drafting tools, references, quiz, rapidograph, ink, bow pens, bow compasses, ink erasers, milar, and tracing paper, you will be able to trace a complex working drawing in ink with no smears and proper line weights as set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 13 pages 257-266 in "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration, by instructor, on proper techniques of inking.
3. Draw or trace in ink the following drawings #D-5 D-8 D-10 E-2-25.
4. Take written quiz 9-Q on inking. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given basic drafting tools, references, quiz, rapidograph, ink, bow pens, bow compasses, ink erasers, milar and tracing paper, you will trace a complex working drawing in ink with no smears and proper line weights as set forth in "Mechanical Drawing" and by the instructor.

✓

QUIZ 9-Q

BD Unit K Comp 1 of 2

UNIT: K Inking

10 points each

1. Nonwaterproof inks are used for ____________________________.
2. What type of ink is used on acetate film?
3. Name the two types of Ink pens.
4. How can you remove ink from polyester drafting film?
5. What are the three widths of lines recommended by the American Drafting Standards Manual?
    a.
    b.
    c.
6. What should be the first thing to be inked? __________________
7. Do you ink horizontal or vertical lines first?
8. What is the name of the instrument used to clean technical fountain pens.

ANSWER SHEET 9-Q

BD Unit K Comp 1 of 2

UNIT: K Inking

10 points each

1. fine line pictorial illustrations
2. acid base
3. a. ruling pens
    b. technical fountain pens (rapidagraph)
4. moisten plastic eraser
5. a. thick
    b. medium
    c. thin
6. arches and circles
7. horizontal
8. Ultrasonic cleaner

STUDENT COMPETENCY SHEET

BD Unit K Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: K Inking

COMPETENCY STATEMENT: Use Leroy Lettering Set

PERFORMANCE OBJECTIVE: Given basic drafting tools, Leroy lettering set you will be able to letter two title sheets for basic drafting course with no smears, no spelling errors, correct spacing and centered on the paper.

LEARNING ACTIVITIES:

1. Read chapter #13 pages 262-264 "Mechanical Drawing" be prepared to discuss.
2. Take part in demonstration on use and cleaning procedures of Leroy lettering set.
3. Use scrap paper to practice using Leroy lettering instruments.
4. Letter, using Leroy lettering instruments, two title sheets for basic drafting course as shown on Handout Sheets #109 and #110.

EVALUATION:

Given basic drafting tools, Leroy lettering set, you will letter two title sheets for basic drafting course with no smears, no spelling errors, correct spacing and centered on the paper.

HANDOUT SHEET #109

BD Unit K Comp 2 of 2

UNIT: K Inking

NAME
ADDRESS
CITY
STATE
PHONE
AGE
SOCIAL SECURITY NO.
HOMEROOM
HOME SCHOOL
HEIGHT
WEIGHT
BIRTH DATE

BD Unit K Comp 2 of 2

UNIT: K Inking

BASIC DRAFTING

MONONGALIA COUNTY VO-TECH CENTER

MORGANTOWN, WEST VIRGINIA
26505

JUNE ,1977

HANDOUT SHEET # 110

DRAWINGS BY:______________

STUDENT COMPETENCY SHEET

BD Unit L Comp 1 of 1

SPECIALIZATION: Basic Drafting

UNIT: L Sectioning

COMPETENCY STATEMENT: Demonstrate knowledge of sectioning symbols, sectioning rules and different types of sections with 80% accuracy.

PERFORMANCE OBJECTIVE: Given basic drafting tools, and references, you will be able to use sectioning rules, techniques and symbols to draw full sections, half sections, offset sections, broken out sections, revolved sections, removed sections, auxiliary sections and assembly sections with 100% accuracy. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 9, pages 173-191 "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on sectioning.
3. Read directions and work problems on problem sheets #L-1, L-2, L-3, 9.4.
4. Take written quiz #9.A on sectioning. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

BD Unit L Comp 1 of 1

EVALUATION:

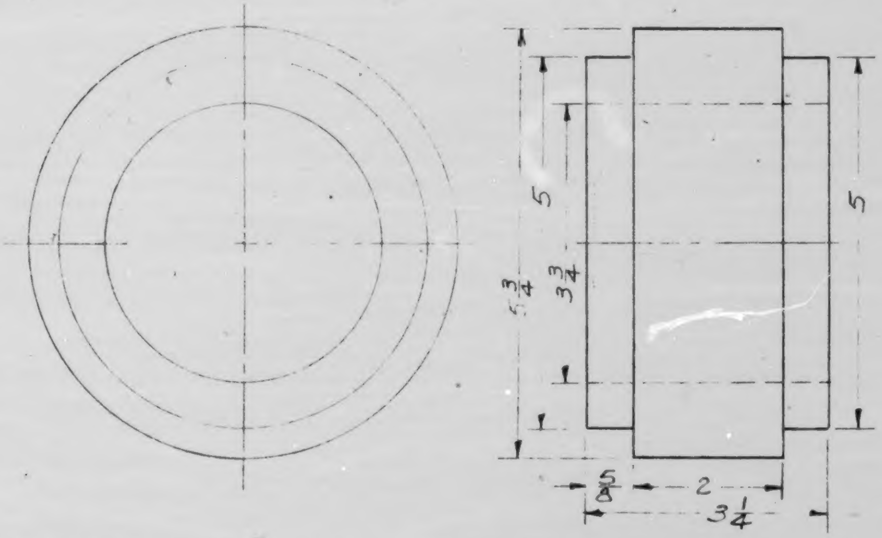
Given basic drafting tools and references, you will use sectioning rules, techniques and symbols to draw full sections, half sections, offset sections, auxiliary sections and assembly sections with 100% accuracy. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #L-1

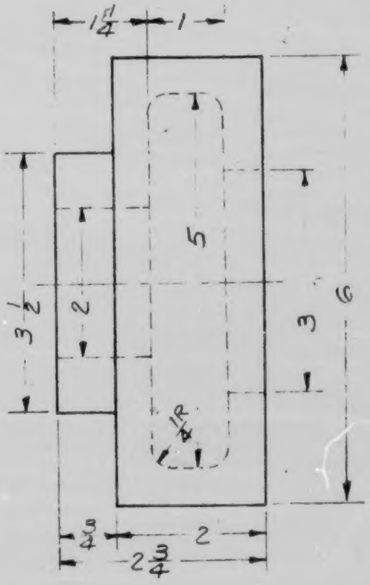
BD Unit L Comp 1 of 1

UNIT: L Sectioning

DIRECTIONS: Divide 12 x 18 sheet of paper into 2 equal parts. Draw necessary views of the following circular objects. Change one view to a section. Space views equally.



L-1-10 Make full section of cylindrical spacer.



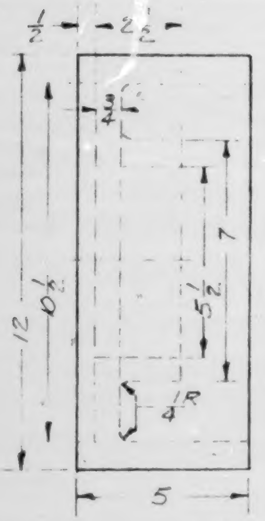
L-1-11 Make full section of reducing spacer.

PROBLEM SHEET L-1 (CON'T)

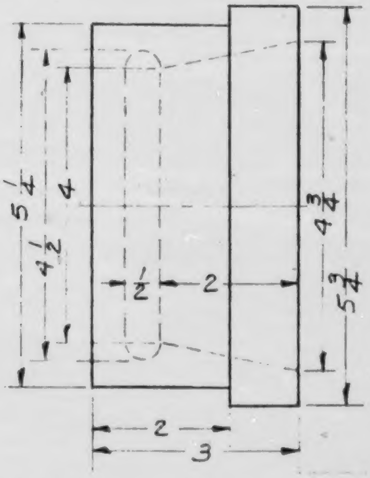
BD Unit L Comp 1 of 1

UNIT: L Sectioning

DIRECTIONS: Divide 12 x 18 sheet of paper into 2 equal parts. Draw necessary views of the following circular objects. Change one view to a section. Space views equally.



L-1-12 Make full section of collar.



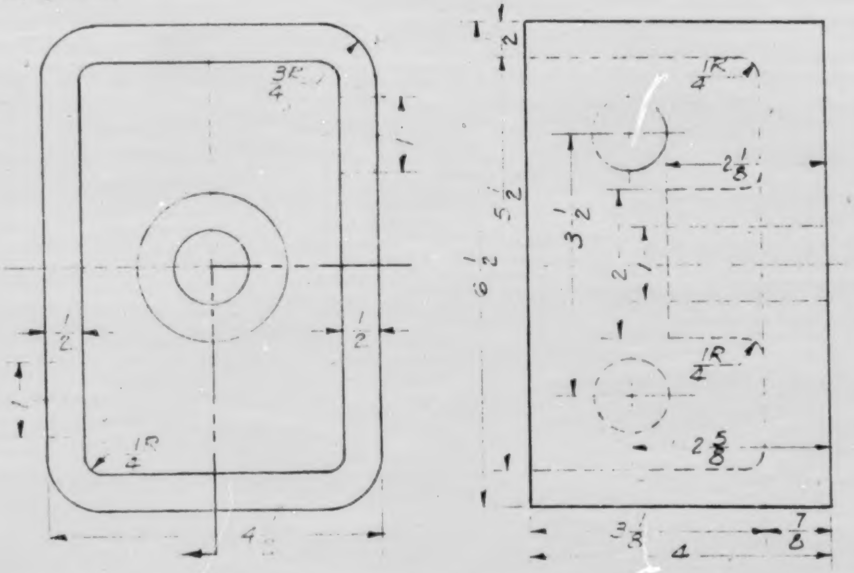
L-1-13 Make full section of shaft cap.

PROBLEM SHEET #L-2

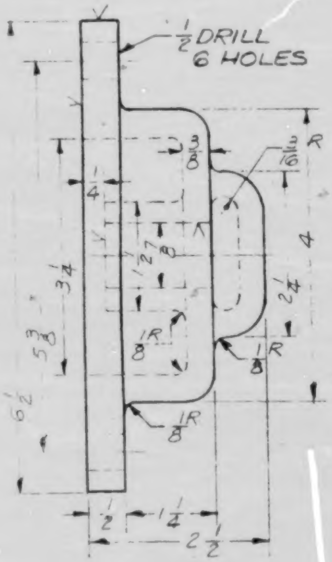
BD Unit L Comp 1 of 1

UNIT: L Sectioning

DIRECTIONS: As given.



L-2-20 Draw two views of protected bearing showing right side view as half section.



L-2-21 Given right side view of cylinder head, draw front view and show half section of the cylinder head.

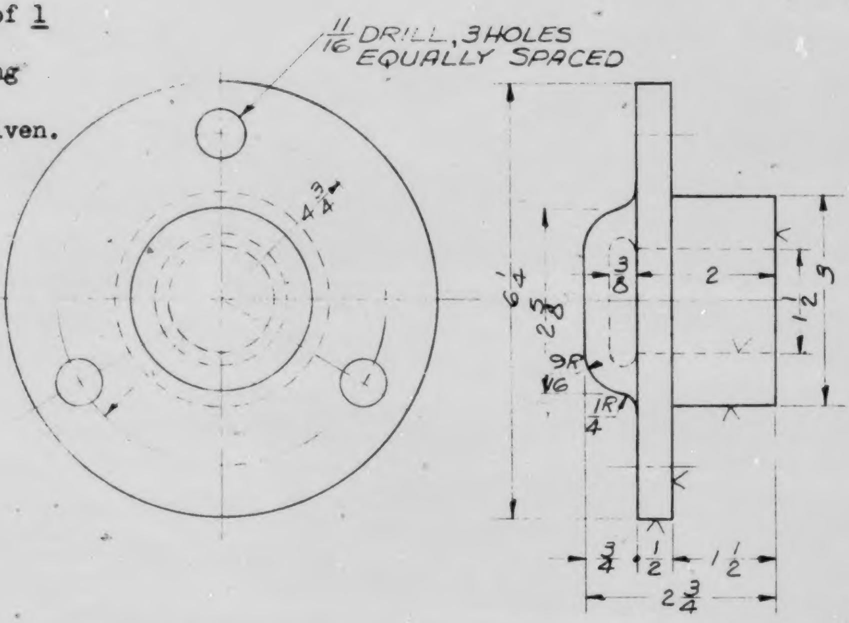
C

PROBLEM SHEET #L-3

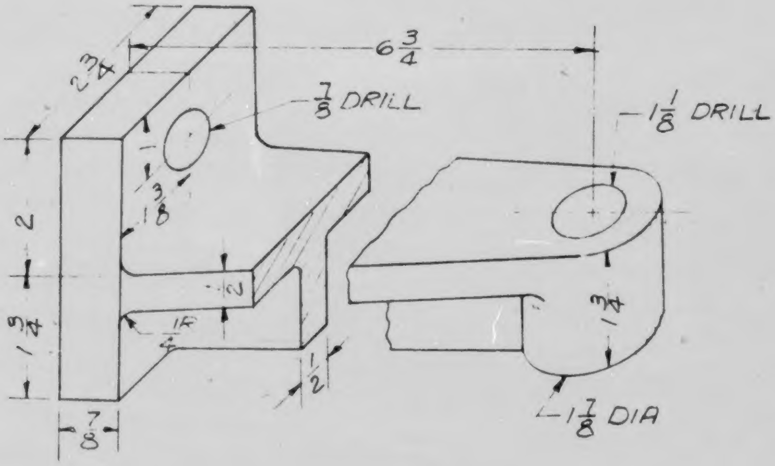
BD Unit L Comp 1 of 1

UNIT: L Sectioning

DIRECTIONS: As given.



L-3-30 Make two view drawing of end cap. Show a full section.



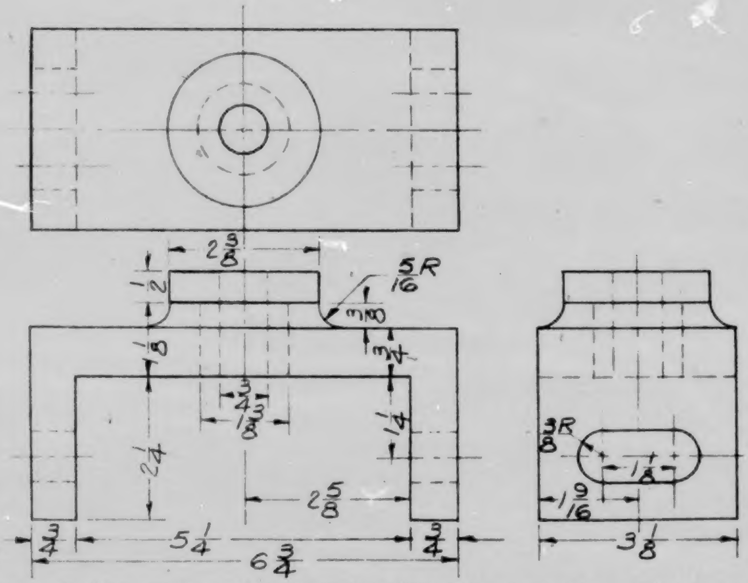
L-3-31 Draw necessary views of bracket. Show a revolved section.

PROBLEM SHEET #L-4

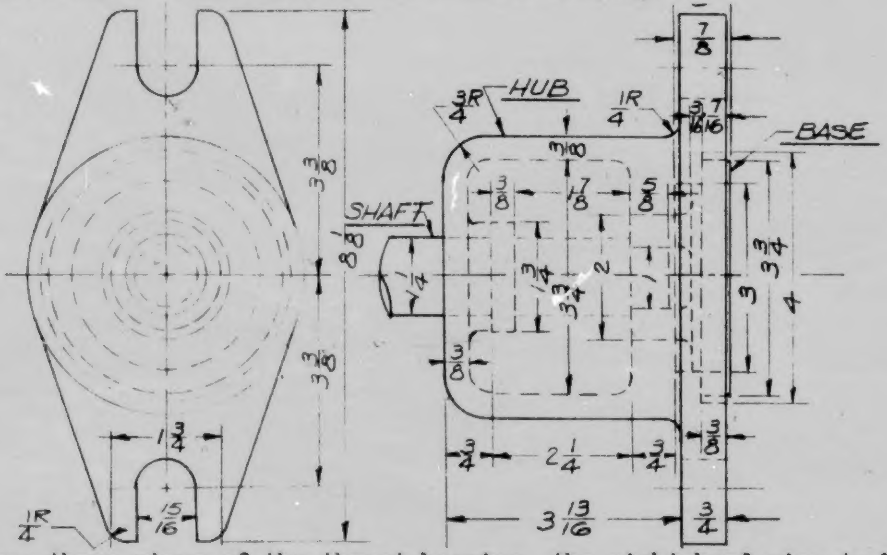
BD Unit L Comp 1 of 1

UNIT: L Sectioning

DIRECTIONS: As given.



L-4-40 Draw three views of the yoke, the front view in section. There are two pieces: the steel yoke and a brass bushing.



L-4-41 Draw three views of the thrust bearing, the right-hand view to be in section. There are three parts, steel shaft, brass base, and cast iron hub.

QUIZ SHEET 10-Q

BD Unit L Comp 1 of 1

UNIT: L Sectioning

5 points each

1. List three different types of sections.

   a. b. c.

2. What rule applies to shafts nuts and rivets when they are cut by the cutting plane line?

3. Define crosshatching and give example.

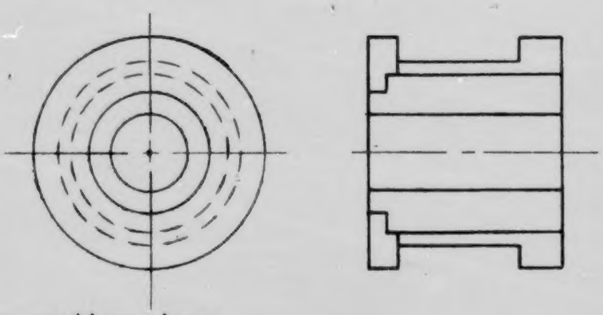
4. Draw two different cutting plane lines.

   a. b.

5. Show symbols for steel, concrete, and the symbol for general use for all materials.

   a. b. c.

6. Section the following figures.



7. T F Hidden lines are shown on a section views.

8. T F When a cutting plane line passes thru a rib or web the section lines are omitted.

9. T F A revolved section provides a means of showing the threads.

10. T F Broken out sections are limited by break lines.

11. T F Section lines are spaced 1/4" apart on a 30' angle.

12. T F Offset sections are offset at one or more places in order to show more details.

ANSWER SHEET 10-Q

BD Unit L Comp 1 of 1

UNIT: L Sectioning

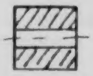
5 points each

1. a. full
   b. half
   c. revolved
   d. removed
   e. broken out
   f. offset
   g. auxiliary

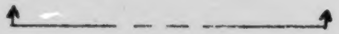
2. Section lines are omitted

3. a. Crosshatching is 1/32 to 1/8 uniformly spaced 45° lines showing the area that is actually cut by the cutting plane.

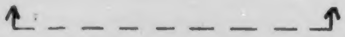
   b.



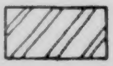
4. a.



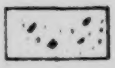
   b.



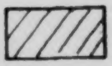
5. a.



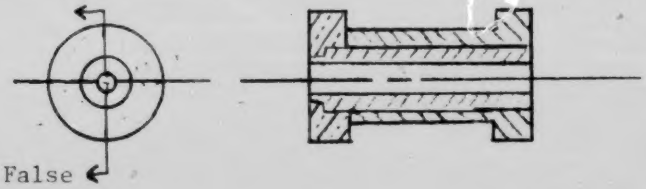
   b.



   c.



6.



7. False

8. True

9. False

10. True

11. False

12. True

STUDENT COMPETENCY SHEET

BD Unit M Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: M Threads and Fasteners

COMPETENCY STATEMENT: Demonstrates knowledge of threads.

PERFORMANCE OBJECTIVE: Given basic drafting tools, a quiz and any references needed, you will be able to demonstrate your knowledge of the following: thread tables, thread terminology, thread notes, thread specifications, representations, acme threads, square threads and unified threads with 80% accuracy.

LEARNING ACTIVITIES:

1. Read chapter 10 pages 192-201 "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on threads.
3. Read directions and draw thread problems given on problem sheets #M-1 & M-2.
4. Take written quiz #11-Q on threads. Must score a minimum of 80% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given basic drafting tools, a quiz and any references needed, you will demonstrate your knowledge of the following: Thread tables, terminology, notes, specifications, representations, square threads, acme threads and unified threads with 80% accuracy.

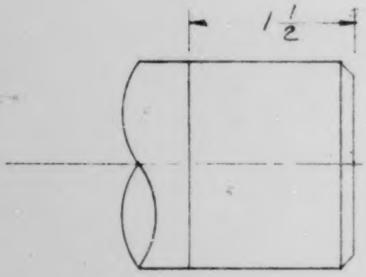
PROBLEM SHEET #M-1

BD Unit M Comp 1 of 2

UNIT: M Threads and Fasteners

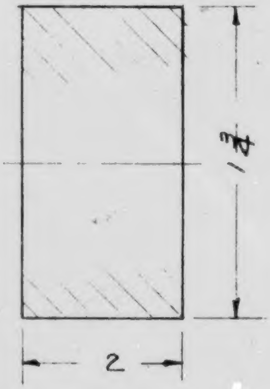
DIRECTIONS: Use a 12 x 18 sheet of tracing paper and divide it into 4 equal blocks. Center each of the following problems into a different block.

M-1-10 Use schematic representation of a 1" - 8 UNC - 2A

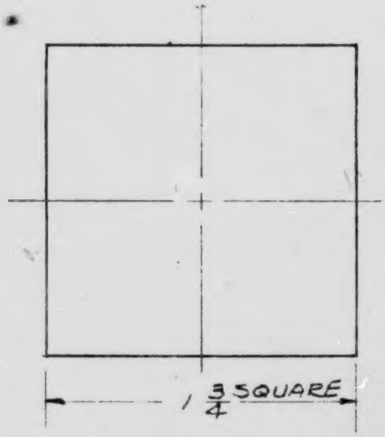


FRONT VIEW

END VIEW



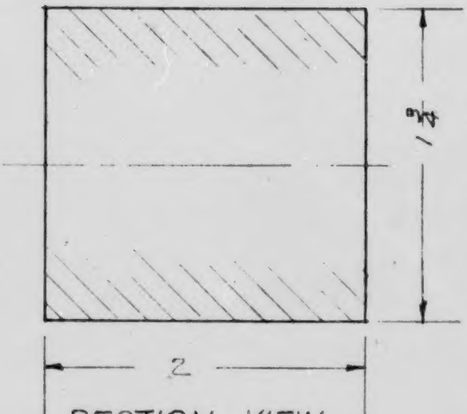
SECTION OF NUT



END VIEW OF NUT

M-1-11 Use schematic representation of a 7/8 drill x 1 1/2 deep,
1" - 8 UNC - 2B x 1 1/8 deep.

END VIEW

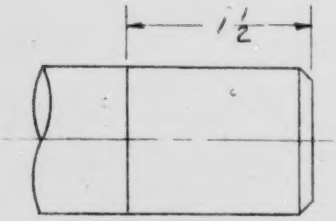


SECTION VIEW

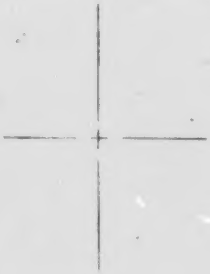
PROBLEM SHEET M-2 Con't.

BD Unit M Comp 1 of 2

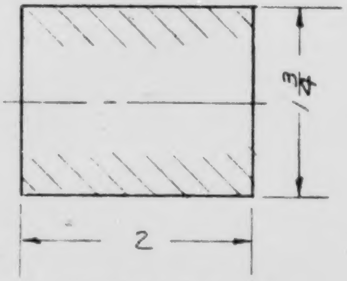
M-2-20 Draw simplified representation of a 1" - 8UNC - 2A thread.



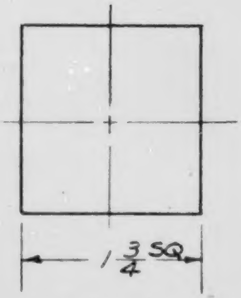
FRONT VIEW



END VIEW

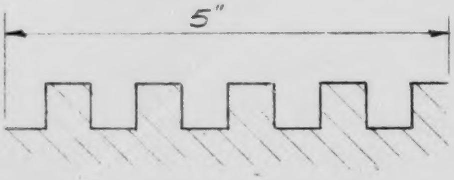


SECTION OF NUT

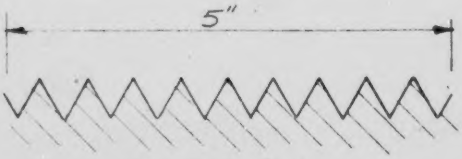


END VIEW OF NUT

M-2-21 Draw profile of square thread and sharp "V" thread with pitch of 1" and dimension fully.



SQUARE



SHARP "V"

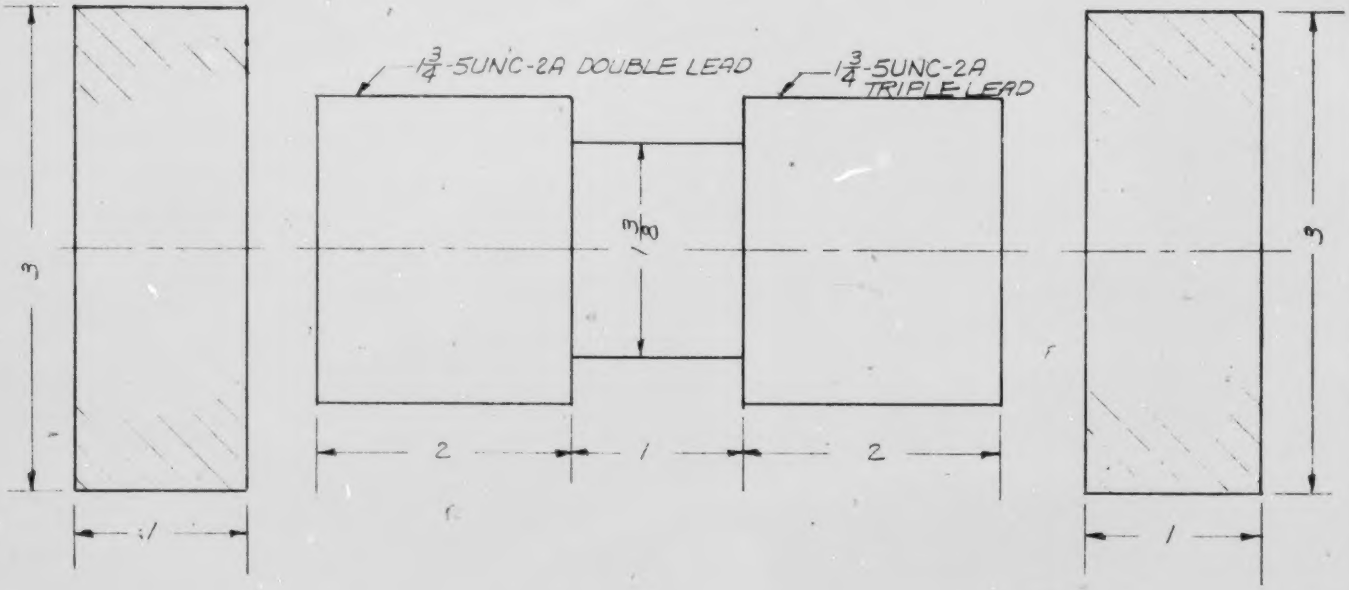
PROBLEM SHEET #M-3

BD Unit M Comp 1 of 2

UNIT: M Threads and Fasteners

DIRECTIONS: Use 12 x 18 sheet of tracing paper and divide it into 4 equal blocks. Center each of the following problems into a different block and show the detailed thread representation for each problem.

M-3-30 Draw detailed thread representation for a 1 3/4 - 5 UNC - 2A sharp "V" thread and a 1 3/4 - 5UNC, L.H. thread.



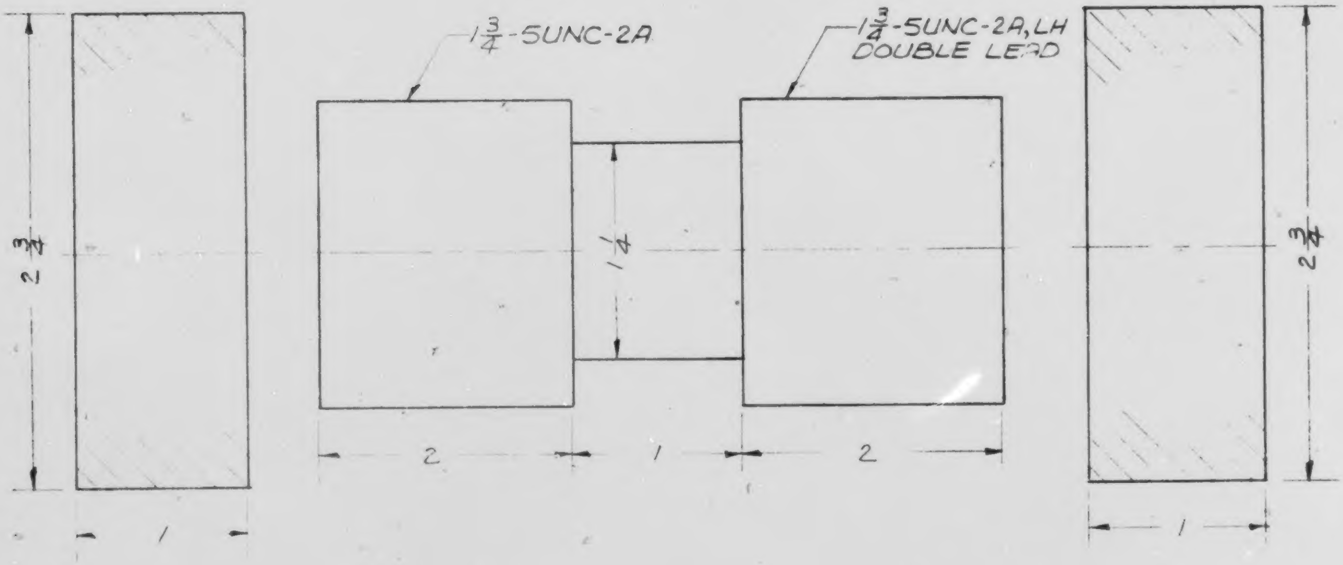
M-3-31 Draw detailed thread representation for a 1 3/4 - 5UNC - 2A double lead thread and a 1 3/4 - 5 UNC - 2A triple lead thread.

PROBLEM SHEET #M-3 (CON'T)

BD Unit M Comp 1 of 2

UNIT: M Threads and Fasteners

DIRECTIONS: Use a 12 x 18 sheet of tracing paper and divide it into 4 equal blocks. Center each of the following problems into a different block and show the detailed thread representation for each problem.

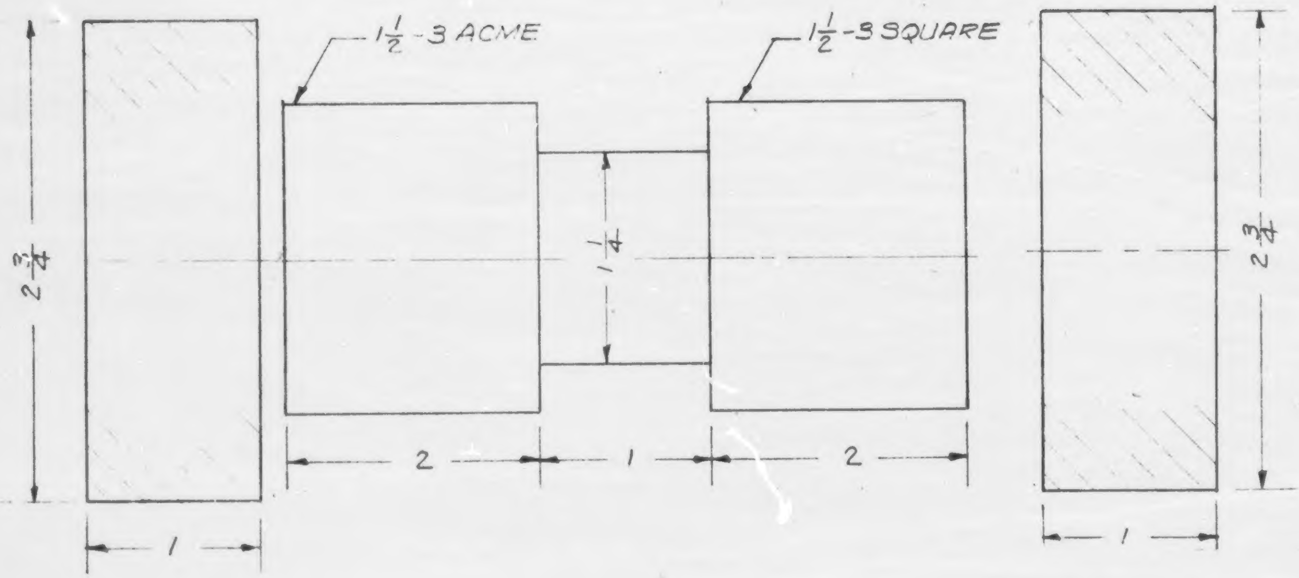


M-3-30 Draw detailed thread representation for a 1 3/4 - 5 UNC - 2A sharp "V" thread and a 1 3/4 - 5UNC, L.H. thread.

PROBLEM SHEET #M-3 Con't.

BD Unit M Comp 1 of 2

M-3-40 Draw detailed thread representation for a 1 1/2-3 Acme thread and a 1 1/3-3 square thread.



QUIZ SHEET #12-Q

BD Unit M Comp 1 of 2

UNIT: M Threads

Points 2 each

1. Screw thread shapes are based on the ____________________ curve.

2. How many threads per inch are there on the following shafts.
   a. 3 5/8 dia shaft w/coarse threads____________________
   b. 1" dia shaft w/fine threads____________________
   c. 3/8 dia shaft w/coarse threads____________________
   d. 2 1/4 dia shaft w/acme threads____________________
   e. 1/2" dia shaft w/square threads____________________
   f. 7/8" - 14 UNF - 2A thread will take a__________size tap

3. Left hand threads are represented by the initials____________.

4. The first person to put a screw to a practical use was_______.

5. List 12 specific threaded fasteners.
   a. ________________ b.________________ c.________________
   d. ________________ e.________________ f.________________
   g. ________________ h.________________ i.________________
   j. ________________ k.________________ l.________________

6. Define:
   a. UNC ____
   b. UNF ____
   c. UNEF____

7. List 6 different screw thread profiles.
   a.________________ b.________________ c.________________
   d.________________ e.________________ f.________________

8. Sketch the representation of a schematic thread representation for a sharp "V" thread.

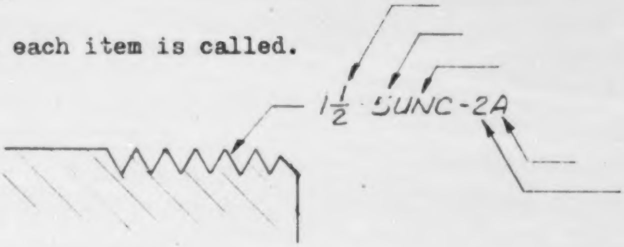
9. Sketch a simplified representation of a sharp "V" thread.

QUIZ SHEET 12-Q (Con't)

BD Unit M Comp 1 of 2

UNIT: M Threads

10. Label what each item is called.



11. Define indicated parts:

a.________________________

b.________________________

c.________________________

d.________________________

e.________________________

f.________________________

g.________________________

h.________________________

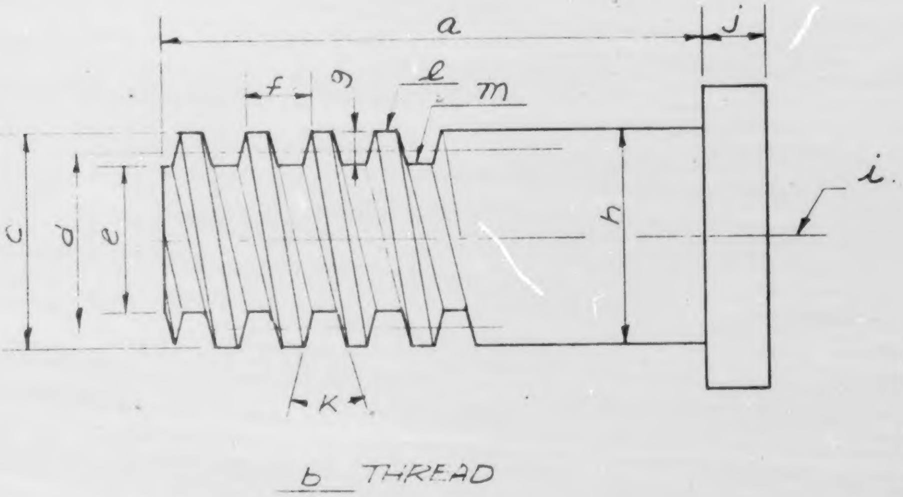
i.________________________

j.________________________

k.________________________

l.________________________

m.________________________



ANSWER SHEET 12-Q

BD Unit M Comp 1 of 2

UNIT: M Threads

2 points each

1. Helix or Helical
2. a. not any
   b. 14 or 12
   c. 16
   d. 3
   e. 10
   f. 13/16
3. L.H.
4. Archimedes
5. a. sq. hd. bolts & nuts
   b. flat head cap screws
   c. expansion bolt
   d. taggle bolt
   e. Steve bolt
   f. machine screws
   g. wood screws
   h. leg screw
   i. button head cap screw
   j. carriage bolt
   k. hex hd. bolt & nuts
   l. turnbuckle
   eye bolt
   set screws
   tire bolt
6. a. Unified National Coarse
   b. Unified National Fine
   c. Unified National Extra Fine

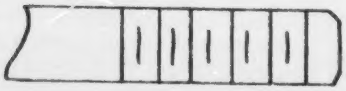
ANSWER SHEET 12-Q (Cont'd)

BD Unit M Comp 1 of 1

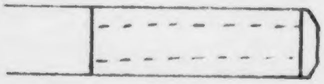
UNIT: M Threads

7. a. American National Unified
   b. Sharp "V"
   c. Square
   d. Worm
   e. Acme Buttress
   f. Knuckle British Standard

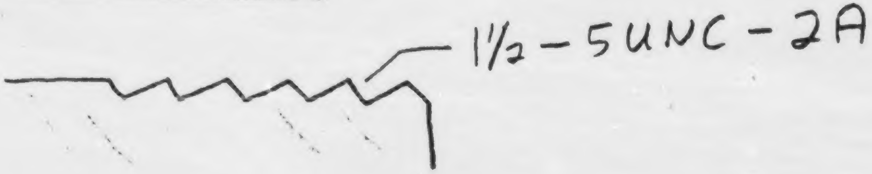
8.



9.



10.



11. a. Length of bolt
    b. Acme
    c. Major diameter
    d. Pitch diameter
    e. Minor diameter
    f. Pitch
    g. Depth of thread
    h. Diameter of screw or bolt
    i. Axis
    j. Thickness of head
    k. Angle of thread
    l. Crest
    m. Root

STUDENT COMPETENCY SHEET

BD Unit M Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: M Threads and Fasteners

COMPETENCY STATEMENT: Demonstrates knowledge of different fasteners.

PERFORMANCE OBJECTIVE: Given basic drafting tools, a quiz and any references needed, you will be able to demonstrate your knowledge of the following fasteners with 80% accuracy: fastener tables, bolts, nuts, washers, cap screws. machine screws, wood screws, keys, rivets, lock nuts, set screws and cotter pins.

LEARNING ACTIVITIES:

1. Read chapter 10 pages 201-208 "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on types of fasteners.
3. Read directions and work problems on problem sheets M-5.
4. Take written quiz 13-Q on fasteners. Must score a minimum of 80% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given basic drafting tools, a quiz and any references needed, you will demonstrate your knowledge of the following fasteners with 80% accuracy: fastener tables, bolts, nuts, washers, cap screws, machine screws, wood screws, keys, rivets, lock nuts, set screws and cotter pins.

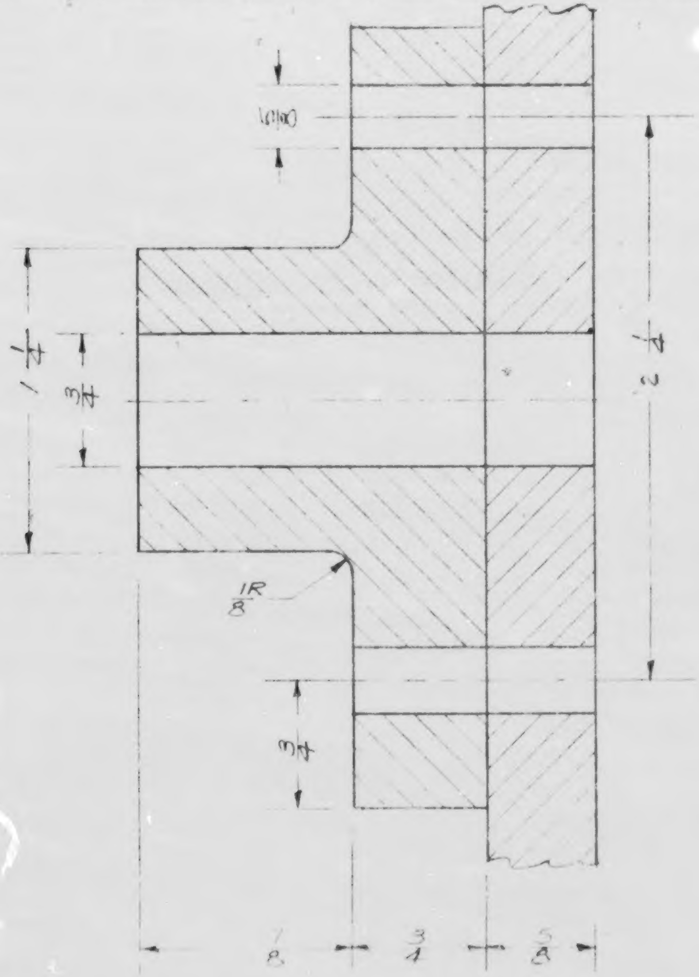
PROBLEM SHEET #M-5

BD Unit M Comp 2 of 2

UNIT: M Threads and Fasteners

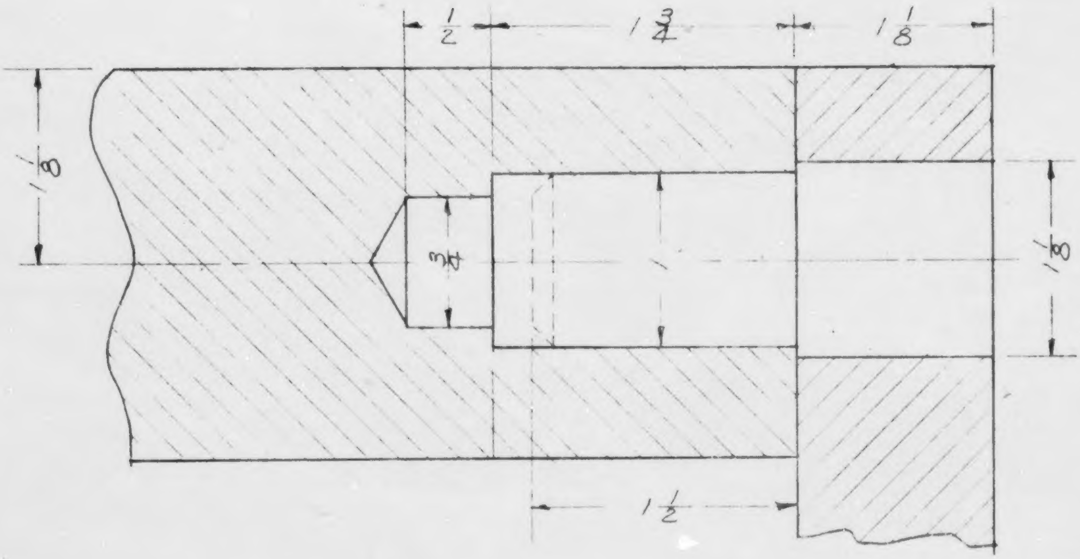
DIRECTIONS: Use a 12 x 18 sheet of tracing paper and divide it into 4 equal parts. Center each of the following problems into a different block. Use schematic threads for all fasteners.

1. Draw the given plates using the given dimensions. Draw the standard 5/8" hex bolt and nut to fasten the plates together. Bolt head to be on left side. Show bolt head across flats and nut across corners.



BD Unit M Comp 2 of 2

2. Draw stud with hex nut shown across corners.



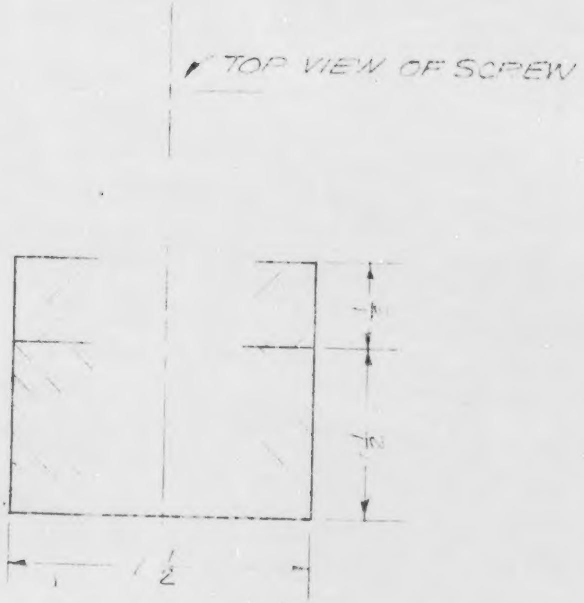
PROBLEM SHEET #M-5 (CON'T)

BD Unit M Comp 2 of 2

UNIT: M Threads and Fasteners

DIRECTIONS: Use 12 x 18 sheet of tracing paper and divide it into 4 equal parts. Center each of the following problems into a different block. Use schematic threads for all fasteners.

3. Draw given figure 3 times spaced equally in the given block. Draw a 5/8 button head cap screw with a top view of the screw head. In figure 2, follow the same instructions as for figure 1, except draw a 1/2" flat head cap screw. In figure 3, follow the same instruction as #1 and #2 except draw a 5/8" fillister head cap screw.



PROBLEM SHEET #M-5 (CON'T)

BD Unit M Comp 2 of 2

4. Draw 3 set screws and top view of each:

A = 3/4 dia x 1 1/4" long, square head, flat point.

B = 3/4 dia x 1 1/4" long, slotted head, oval point.

C = 3/4 dia x 1 1/4" long, socket head, cup point.

A

B

C

QUIZ SHEET 13-Q

BD Unit M Comp 2 of 2

UNIT: M Threads and Fasteners

Points 4 each

1. List 5 different points used on set screws.
   a.______________ b.______________ c.______________

   d.______________ e.______________

2. Name 5 different machine screws.
   a.______________ b.______________ c.______________

   d.______________ e.______________

3. Name 5 cap screws.
   a.______________ b.______________ c.______________

   d.______________ e.______________

4. What are woodruff keys used for? ____________________________

5. What would be the inside dia., outside dia., and thickness of a plain washer to fit on a 3/4" shaft?
   a. inside dia.

   b. outside dia.

   c. thickness

6. What is the thickness of a cotter pin to fit in a 1/4" dia. hole?

   ____

7. What is the thickness of a #809 woodruff key? ______________

8. What is the distance across the flats for a 1 1/8" hexagon cap screw? ____________________________

9. What is the height of a 1 7/8" semifinished heavy hexagon nut?________

10. What is the height of a 7/8" bolthead for a regular square bolt?______

11. What is the thickness of a regular unfinished hex nut for a 1 3/8" dia. shaft? ____________________________

ANSWER SHEET 13-Q

BD Unit M Comp 2 of 2

UNIT: M Threads and Fasteners

4 points each

1. a. flat
   b. cup
   c. oval
   d. cone
   e. full dog
   f. half dog

2. a. flat
   b. oval
   c. round
   d. fillister
   e. truss
   f. binding
   g. ran

3. a. hex cap screw
   b. fillister
   c. flat
   d. button
   e. socket
   f. hex socket

4. Keep objects from turning on shafts.

5. a. 13/16
   b. 1 1/2, 1 3/4, 2, 2 7/8
   c. 10 gauge.134, 9 gauge.148, or 8 gauge .165

6. .250

7. 1/4"

8. 1 11/16

9. 1 27/32

10. 19/32

11. 1 13/64

STUDENT COMPETENCY SHEET

BD Unit N Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: N Drafting Media and Reproduction

COMPETENCY STATEMENT: Describe the different types of drafting media.

PERFORMANCE OBJECTIVE: Given basic drafting tools, a quiz and any references needed, you will be able to define the different types of drafting media with 90% accuracy. Answers must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 14 pages 271-273 in "Mechanical Drawing" and be prepared to discuss.
2. Observe and participate in demonstration on drafting media by instructor.
3. Ask instructor for a piece of 8 1/2 x 11 translucent tracing paper and draw figure shown on problem sheet #14.1.
4. Ask instructor for a piece of 8 1/2 x 11 sepia paper and draw figure shown on problem sheet #N-1.
5. Ask instructor for pieces of 8 1/2 x 11 cloth and ink figure shown on problem sheet #N-1.
6. Ask instructor for piece of 8 1/2 x 11 polyster film and draw figure shown on problem sheet #N-1.
7. Ask instructor for piece of 8 1/2 x 11 illustration board and draw figure shown on problem sheet #N-1.
8. Take written quiz #14-Q on drafting media. Must score a minimum of 90% correct.

BD Unit N Comp 1 of 2

9. If you have problems with learning activities 1-8, ask instructor for additional help.

EVALUATION:

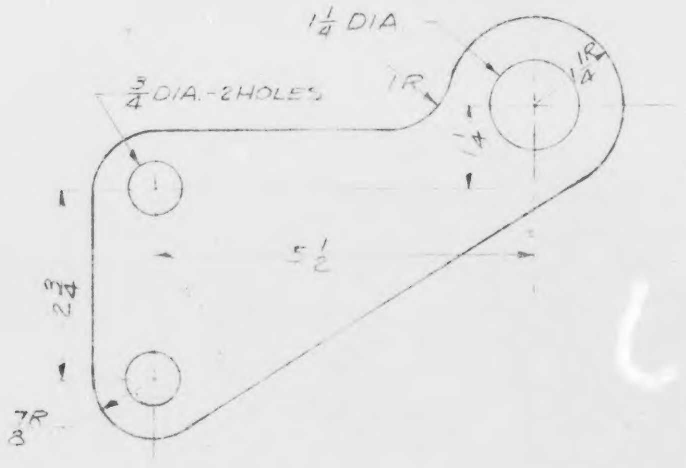
Given basic drafting tools, a quiz and any references needed, you will define the different types of drafting media with 90% accuracy. Answers must meet the standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #N-1

BD Unit N Comp 1 of 2

UNIT: N Drafting Media and Reproduction

DIRECTIONS: Ask instructor for 8 1/2 x 11 piece of paper as stated in given learning activity. Draw the figure below using directions from learning activity. No border or title block is needed.



STUDENT COMPETENCY SHEET

BD Unit N Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: N Drafting Media and Reproduction

COMPETENCY STATEMENT: Operate Print Machine

PERFORMANCE OBJECTIVE: Given print machine, print paper and developer, you will be able to run the print machine using the proper sequence so as to get a clear easy to read print. The print must show all the details shown on the original tracing.

LEARNING ACTIVITIES:

1. Read chapter 14 pages 273-279 in "Mechanical Drawing".
2. Read handout sheet #111 on operation and cleaning of different types print machines.
3. Observe demonstration, by advanced student, on proper sequences and operation of print machine.
4. Take 5 of your tracings and run one print of each thru the print machine and compare them to prints run by advanced student.
5. Run a copy of two sets of prints recommended by instructor. If prints don't turn out properly, consult with instructor as to why, then run the prints again.
6. Run a sepia of one of your tracings.

EVALUATION:

Given print machine, print paper and developer, you will run the print machine using the proper sequences so as to get a clear easy to read print. The print must show all the details shown on the original tracing.

HANDOUT SHEET #111

BD Unit N Comp 2 of 2

UNIT: N Drafting Media and Reproduction:

Operation Print Machine

a. Check amonia level in print machine.

b. Clean trays on print machine.

c. Turn on master switch.

d. Turn on lamp switch.

e. Turn speed to 20 while machine warms up.

f. When temperature of machine reaches 100 degrees the machine is ready to use.

g. Check amonia flow.

h. Set speed of machine to correspond with the speed shown on the pack of print paper.

i. Place print paper with yellow side up and plase the tracing face up on top of the print paper.

j. Insert both into the machine.

k. When papers come out in first tray separate them and insert the print paper under the chrome bar.

l. Finished print shall come out in top tray.

Shutting Print Machine Off

a. Turn lamp switch "off".

b. Insert brown wrapping paper into top part of machine.

c. Shut master switch "off".

d. Turn timer switch to 15 minutes.

e. Make sure print paper is wrapped up and put into file cabinet.

QUIZ 14-Q

BD Unit N Comp 1 of 2

UNIT: N Drafting Media and Reproduction

10 points each

1. Define cloth drafting media.
2. Define sepia drawing paper.
3. Define illustration board.
4. Define polyester film.
5. Define vellum paper.
6. What grade paper is used for sketching?
7. What paper accepts ink the best?
8. What paper is used most often for quick reproduction drawings?
9. T F Preprinted grid lines shown on reproduction copies.
10. T F Sepia paper is chemically treated.

ANSWER SHEET 14-Q

BD Unit N Comp 1 of 2

UNIT: N Drafting Media and Reproduction

10 points each

1. Is excellent for pencil or ink, permanent, erasable, high reproduction qualities and expensive.
2. Print paper that can be erased by chemicals and then drawn on and then run prints of it.
3. Proposal drawings for clients approval are drawn on illustration board.
4. Best drawing media. Expensive, highly transparent, ageproof, accepts both pencil and ink well.
5. Consists of ray content with adequate strength but limited transparency, accepts both pencil and ink.
6. Natural translucent paper without ray content.
7. Cloth
8. Vellum
9. False
10. True

STUDENT COMPETENCY SHEET

BD Unit 0 Comp 2 of 4

SPECIALIZATION: Basic Drafting

UNIT: 0 Dimensioning

COMPETENCY STATEMENT: Know common abbreviations used on basic drawings.

PERFORMANCE OBJECTIVE: Given a written quiz and no references, you will be able to list the abbreviation for a given term, or the term for a given abbreviation. Your answers must meet the standards set forth in "Mechanical Drawing" and Handout Sheet #112.

LEARNING ACTIVITIES:

1. Read chapter 6 pages 120-121 in "Mechanical Drawing" and be prepared to discuss.
2. Study the abbreviations on handout #112.
3. Take written test on abbreviations. Must score a minimum of 90% correct.
4. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given a written quiz, no references, you will list the abbreviations for a given term, or the term for a given abbreviation. Your answers must meet the standards set forth in "Mechanical Drawing" and Handout Sheet #112.

HANDOUT SHEET #112

BD Unit 0 Comp 2 of 4

UNIT: 0 Dimensioning

COMMON ABBREVIATIONS

At	@
Bolt Circle	B.C.
Center to Center	C.C.
Circumference	
Counterbore	C'Bore
Finish All Over	F.A.O.
Gauge	Ga
Head	HD
Hexagon	Hex
Horsepower	H.P.
Minimum	Min.
American National Standard Coarse Thread	N.C.
American National Standard Fine Thread	N.F.
American National Standard Extra Fine Thread	N.E.F.
Number	No. #
Octagon	Oct.
Right Hand	R.H.
Round	RD.
Revolutions Per Minute	R.P.M.
Standard	Std.
Square	Sq.
Thread	Thd.
Wrought Iron	W.I.
Area	A
Plate	PL or IL
Column	Col.
Concrete	Conc.
Figure	Fig.
Floor	Flr.
Addendum	Add.
Dedendum	Ded.

QUIZ 15-Q

BD Unit 0 Comp 2 of 4

UNIT: 0 Dimensioning

1.05 points each

Complete each of the items as specified below. No references may be used.

I. Give the abbreviations for each of the following:

1. Alloy ____________________
2. Bolt Circle ____________________
3. Center Line ____________________
4. Center to Center ____________________
5. Circumference ____________________
6. Counter Bore ____________________
7. Counter Sink ____________________
8. Degree ____________________
9. Keyway ____________________
10. Diameter ____________________
11. Finish All Over ____________________
12. AT ____________________
13. Degree ____________________
14. Flat ____________________
15. Gauge ____________________
16. Dimension ____________________
17. Head ____________________
18. Headless ____________________
19. Hexagon ____________________
20. Horsepower ____________________
21. Inch ____________________
22. Left Hand ____________________
23. Machine ____________________
24. Maximum ____________________
25. Millimeters ____________________
26. Minimum ____________________
27. American National Standard Coarse Thread ____________________
28. American National Standard Fine Thread ____________________
29. American National Standard Extra Fine Thread ____________________
30. American National Standard Special Thread ____________________
31. Number ____________________
32. Octagon ____________________
33. Radius ____________________
34. Right Hand ____________________
35. Round ____________________
36. Revolutions Per Minute ____________________
37. Material ____________________
38. Not to Scale ____________________
39. Standard ____________________
40. Square ____________________
41. Thread ____________________

QUIZ 15-Q (Con't)

BD Unit 0 Comp 2 of 4

UNIT: 0 Dimensioning

1.05 points each

42. Aluminum ______________________
43. Babbitt ______________________
44. Brass ______________________
45. Bronze ______________________
46. Cast Iron ______________________
47. Cold Rolled Steel ______________________
48. Cold Finished Steel ______________________
49. Copper ______________________
50. High Speed Steel ______________________
51. Mild Steel ______________________
52. Malleable Iron ______________________
53. Machine Steel ______________________
54. Steel Casting ______________________
55. Steel Forging ______________________
56. Steel Tubing ______________________
57. Tool Steel ______________________
58. Wrought Iron ______________________
59. Area ______________________
60. Ball Bearing ______________________
61. Plate ______________________
62. Chamber ______________________
63. Circle ______________________
64. Column ______________________
65. Concrete ______________________
66. Figure ______________________
67. Floor ______________________
68. Reference ______________________
69. Screw ______________________
70. Tolerance ______________________

ANSWER SHEET 15-Q

BD Unit 0 Comp 2 of 4

UNIT: 0 Dimensioning

1.05 points each

1. ALY
2. B.C.
3. ℄
4. C.C.
5. CIRC
6. C'Bore
7. CSK
8. (°) DEG
9. KWY
10. DIA.
11. F.A.O.
12. @
13. (°) DEG
14. F
15. GA.
16. DIM
17. HD
18. HDLS
19. HEX
20. HP
21. (") IN.
22. L.H.
23. MACH
24. MAX
25. MM
26. MIN
27. UNC
28. UNF
29. UNEF
30. UN
31. NO (#)
32. OCT.
33. R
34. R.H.
35. R.D.
36. R.P.M.
37. MATL.
38. N.T.S.
39. STD
40. SQ.
41. THD.
42. AL.
43. BAB
44. BRS
45. BRZ
46. CI
47. CRS
48. CFS
49. COP.
50. HSS
51. M STL
52. M.I.
53. MACH STL
54. STL. CSTG.
55. STL. FORG.
56. STL. TUB.
57. TS
58. WI
59. A
60. BB
61. ⅊
62. CHAM
63. CIR
64. COL
65. CONC.
66. FIG
67. FLR
68. REF
69. SCR
70. TOL.

STUDENT COMPETENCY SHEET

BD Unit 0 Comp 3 of 4

UNIT: 0 Dimensioning

COMPETENCY STATEMENT: Use notes required on basic drawings

PERFORMANCE OBJECTIVE: Given a written quiz and references, you will be able to identify notes required for dimensioning an object. Your answers must meet the standards set forth in "Mechanical Drawing".

LEARNING ACTIVITIES:

1. Read chapter 6, pages 119-120 in "Mechanical Drawing" and be prepared to discuss.
2. Study Figure 6-46 page 120 in "Mechanical Drawing".
3. Take written quiz 16-Q on notes. Must score a minimum of 90% correct.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

Given a written quiz and references, you will identify notes required for dimensioning an object. Your answers must meet the standards set forth in "Mechanical Drawing".

QUIZ 16-Q

BD Unit 0 Comp 3 of 4

UNIT: 0 Dimensioning

20 points each

1. Sketch a 1" drill hole and label note.
2. Sketch 5/8 spotface and 3/8 drill thats 1/8" deep.
3. Sketch a 90° countersunk hole that goes from 1/2" dia. to 1" dia.
4. Sketch a 7/16 drill with 7/8 dia counterbore that is 1/4" deep.
5. Sketch a .485 drill to a .500 ream.

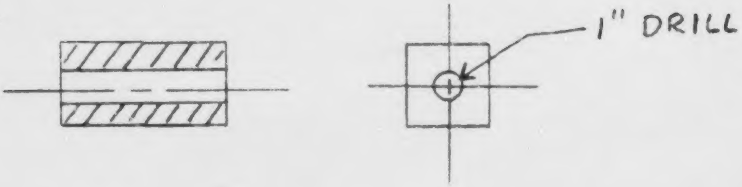
ANSWER SHEET 16-Q

BD Unit 0 Comp 3 of 4

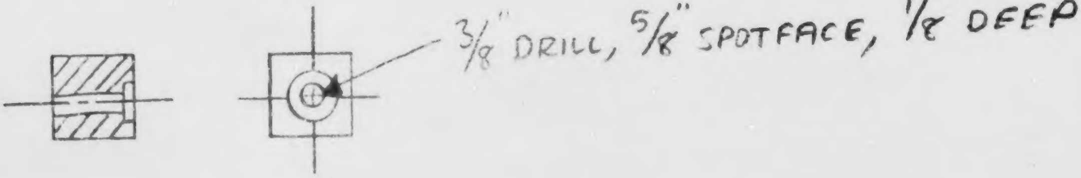
UNIT: 0 Dimensioning

20 points each

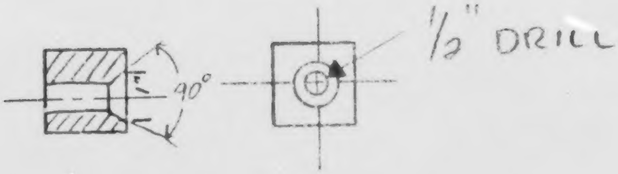
1.



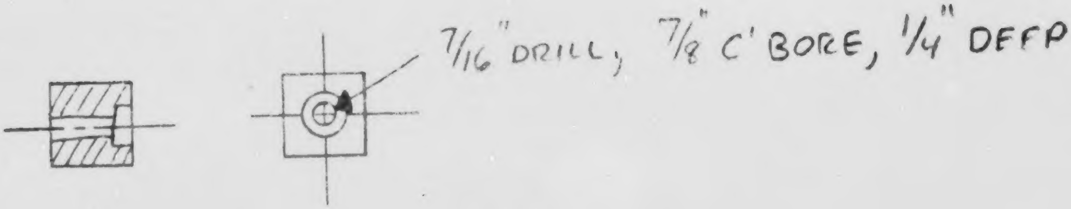
2.



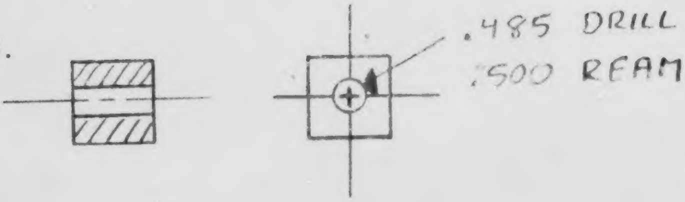
3.



4.



5.



STUDENT COMPETENCY SHEET

BD Unit O Comp 4 of 4

SPECIALIZATION: Basic Drafting

UNIT: O Dimensioning

COMPETENCY STATEMENT: Use tolerances required on basic drawings

PERFORMANCE OBJECTIVE: Given a written quiz and references, you will be able to describe limit dimensioning, tolerances, and the ANSIY14.5 dimensioning standards with 100% accuracy. Your answers must meet the standards set forth in "Mechanical Drawing".

LEARNING ACTIVITIES:

1. Read chapter 6, pages 121-130 in "Mechanical Drawing".
2. Take written quiz 17-Q on tolerances. Must score a minimum of 100% correct.
3. If you have problems with learning activities 1-2, ask instructor for additional help.

EVALUATION:

Given a written quiz and references, you will describe limit dimensioning, tolerances and the ANSIY14.5 dimensioning standards with 100% accuracy. Your answers must meet the standards set forth in "Mechanical Drawing".

QUIZ 17-0

BD Unit 0 Comp 4 of 4

UNIT: 0 Dimensioning

16 points each

1. Specifying the maximum allowable variation in form and position is called ____________________.
2. There are two kinds of tolerances: unilateral and ____________________.
3. The total amount by which a given dimension may vary is called__________.
4. Points, lines, or planes assumed to be exact for purposes of computation are called ____________________.
5. The surface of all material has some irregularities. This is called __________________.
6. What are the two things that dimensioning must do?

ANSWER SHEET 17-Q

BD Unit 0 Comp 4 of 4

UNIT: 0 Dimensioning

16 points each

1. Limits
2. Bilateral
3. Tolerance
4. Datum
5. Surface Texture
6. a. size
   b. location

STUDENT COMPETENCY SHEET

BD Unit P Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: P Working Drawings

COMPETENCY STATEMENT: Demonstrate knowledge of detailed drawings.

PERFORMANCE OBJECTIVE: Given basic drafting tools, references and quiz, you will be able to draw the necessary detail drawings from a given assembly drawing. The drawings must consist of the proper views, notes, specifications, scale and basic drawing techniques as set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 11, pages 214-218 in "Mechanical Drawing" and be prepared to discuss.
2. Observe demonstration, by instructor on detail drawings.
3. Read directions and work problems on problem sheets #11.1, 11.2, 11.3, and 11.4.
4. Take written quiz 18-Q on detailed drawings. Must score a minimum of 80% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

BD Unit P Comp 1 of 2

EVALUATION:

Given basic drafting tools, references and quiz, you will draw the necessary detailed drawings from a given assembly drawing. The drawing must consist of the proper views, notes, specifications, scale and basic drawing techniques as set forth in "Mechanical Drawing" and by the instructor.

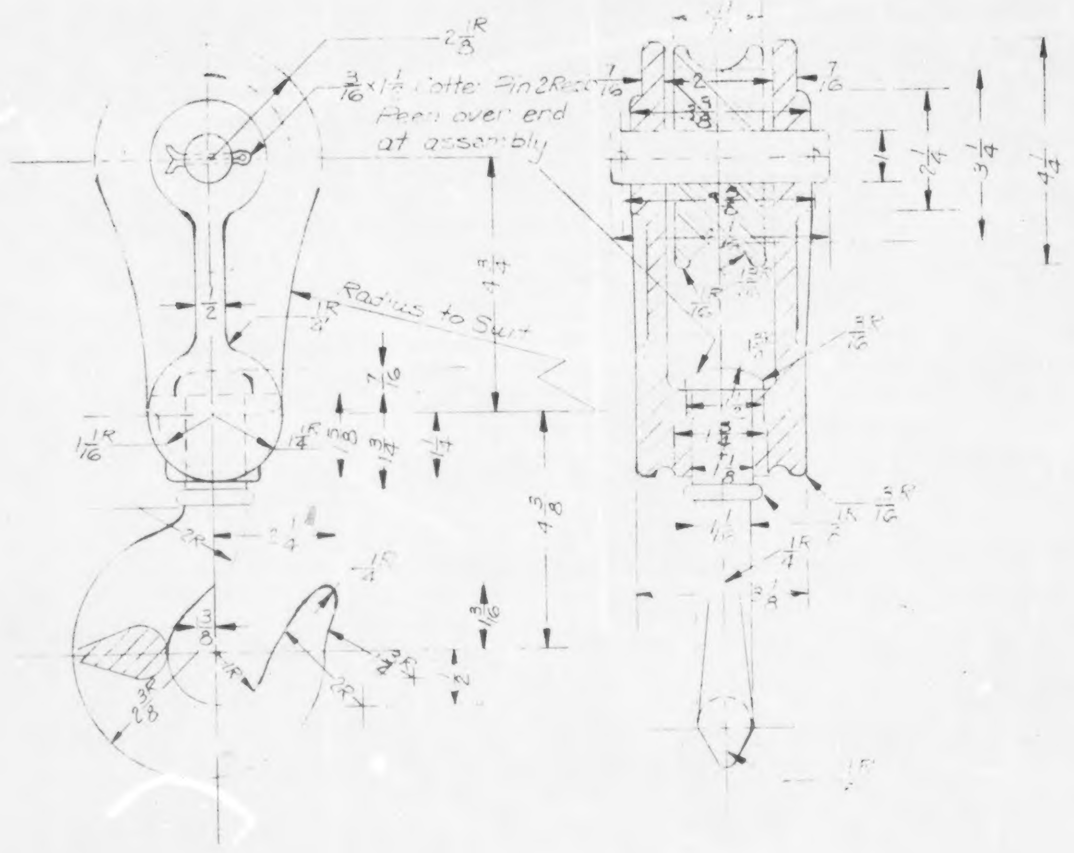
PROBLEM SHEET #11.1

BD Unit P Comp 1 of 2

UNIT: P Working Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make detail drawing and complete bill of material.



CRANE HOOK

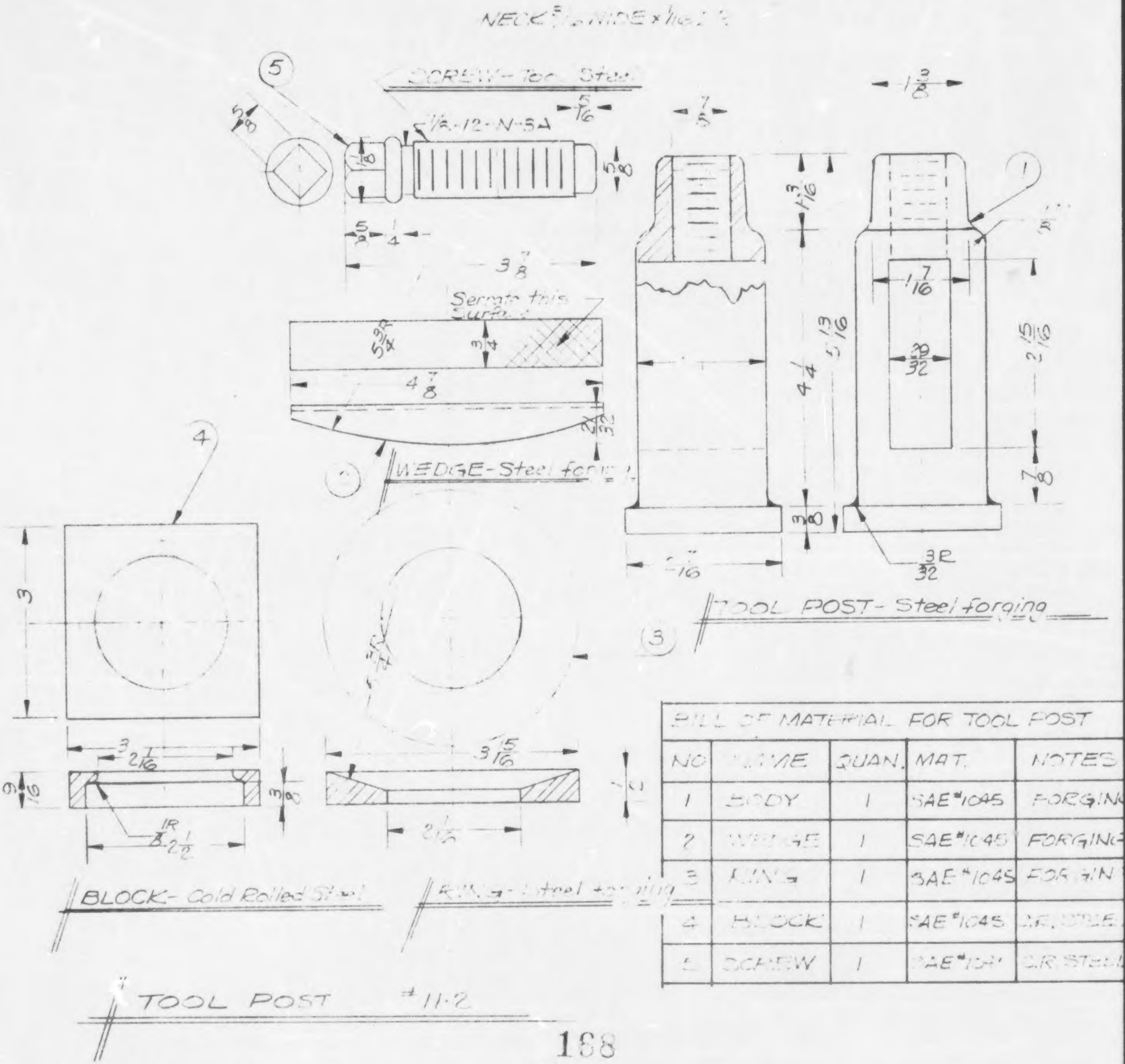
PROBLEM SHEET #11.2

BD Unit P Comp 1 of 2

UNIT: P Working Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make detail drawing and complete bill of material.



BILL OF MATERIAL FOR TOOL POST				
NO	NAME	QUAN.	MAT.	NOTES
1	BODY	1	SAE #1045	FORGIN
2	WEDGE	1	SAE #1045	FORGIN
3	RING	1	SAE #1045	FORGIN
4	BLOCK	1	SAE #1045	C.R. STEE
5	SCREW	1	SAE #10[illegible]	C.R. STEE

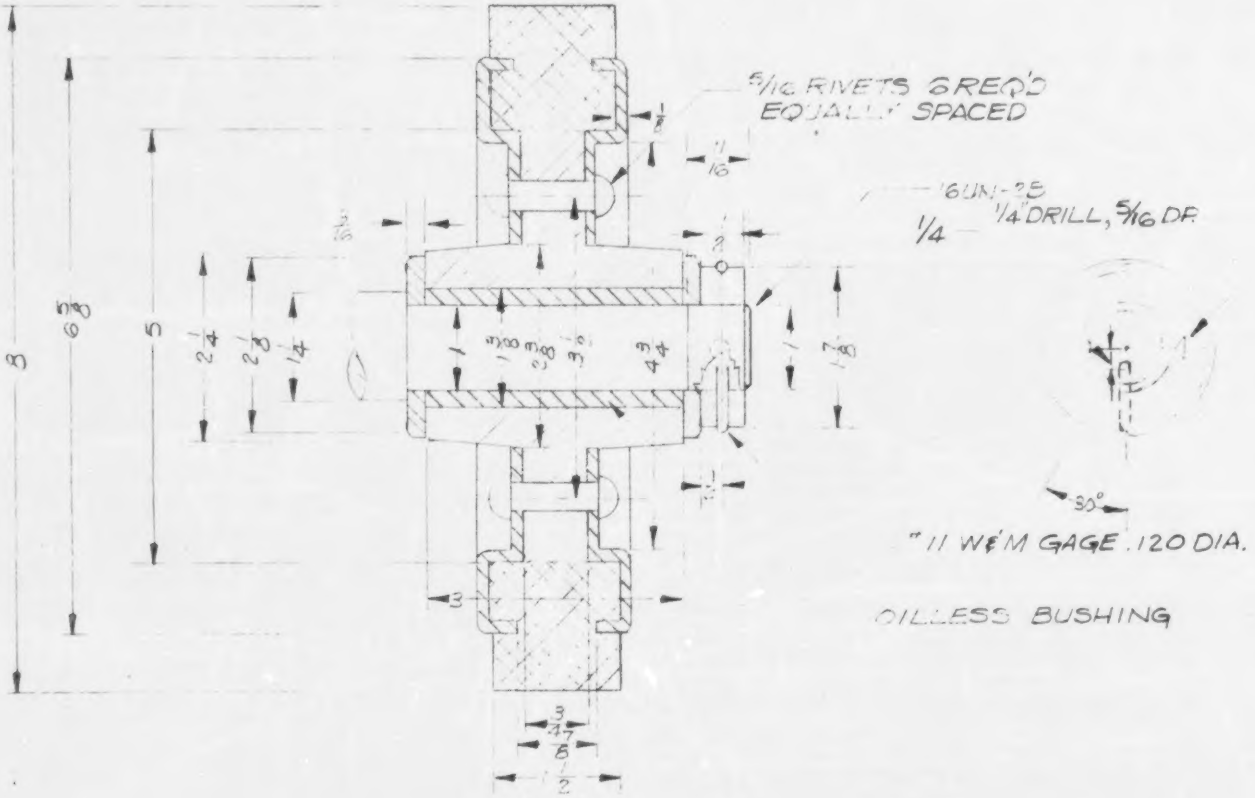
PROBLEM SHEET #11.3

BD Unit P Comp 1 of 2

UNIT: P Working Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make detail drawing and complete bill of material.



CUSHION WHEEL #11.3

QUIZ 18-Q

BD Unit P Comp 1 of 2

UNIT: P Working Drawings

20 points each

1. What is the name given to a drawing that supplies all information necessary for making a simple part?
2. T F Bill of material goes on detail sheet.
3. T F Most industrial drawings are done in ink.
4. The term working drawing includes ________________drawings and ________________drawings.

ANSWER SHEET 18-Q

BD Unit P Comp 1 of 2

UNIT: P Working Drawings

1. Detail drawing
2. False
3. False
4. a. assembly
   b. detail

STUDENT COMPETENCY SHEET

BD Unit P Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: P Working Drawings

COMPETENCY STATEMENT: Demonstrate knowledge of Assembling Drawings

PERFORMANCE OBJECTIVE: Given basic drafting tools, references and quiz, you will be able to draw the necessary assembly drawings from a series of detailed drawings. The drawings must consist of the proper views, dimensions, bill of material and basic drawing techniques as set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 11, pages 219-225 in "Mechanical Drawing" and be prepared to discuss.
2. Observe demonstration, by instructor, on assembling drawings.
3. Read directions and work problems on problem sheets #11.20, 11.21, 11.22, 11.23.
4. Take written quiz 19-Q on assembling drawings. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given basic drafting tools, references and quiz, you will draw the necessary assembling drawings from a series of detailed drawings. The drawings must consist of the proper views, dimensions, bill of materials and basic drawing techniques as set forth in "Mechanical Drawing" and by the instructor.

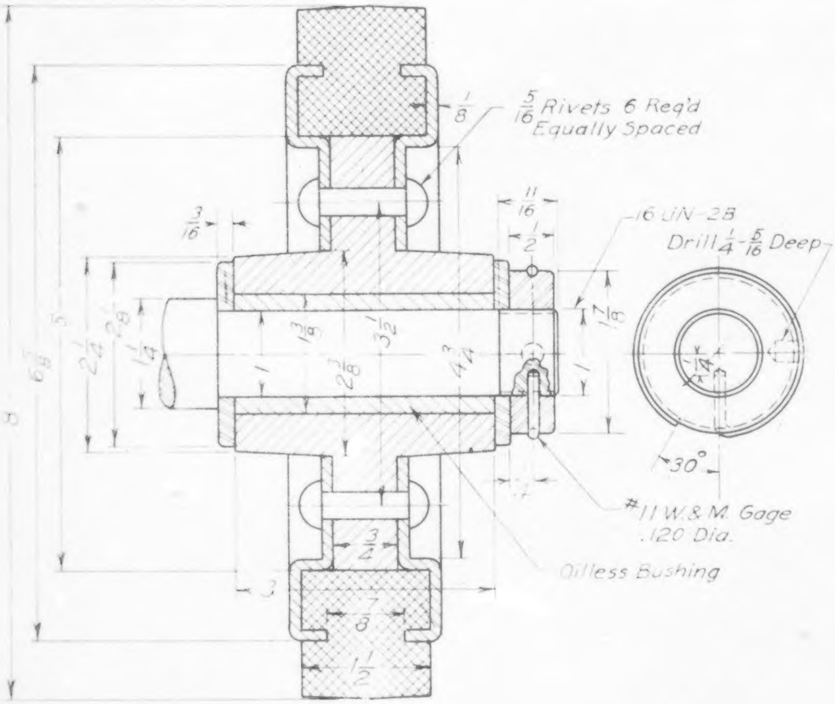
PROBLEM SHEET #11.20

BD Unit P Comp 2 of 2

UNIT: P Working Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make assembling drawing and complete bill of material.



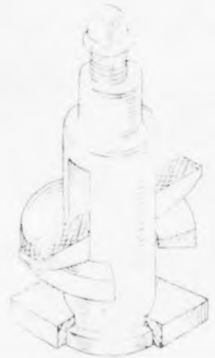
PROBLEM SHEET #11.21

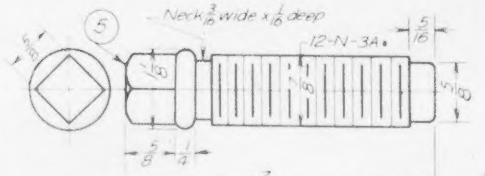
BD Unit P Comp 2 of 2

UNIT: P Working Drawings

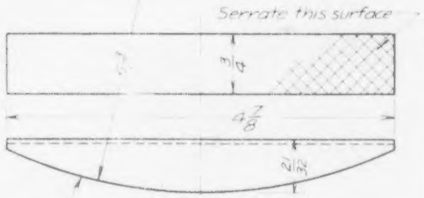
DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make assembling drawing and complete bill of material.

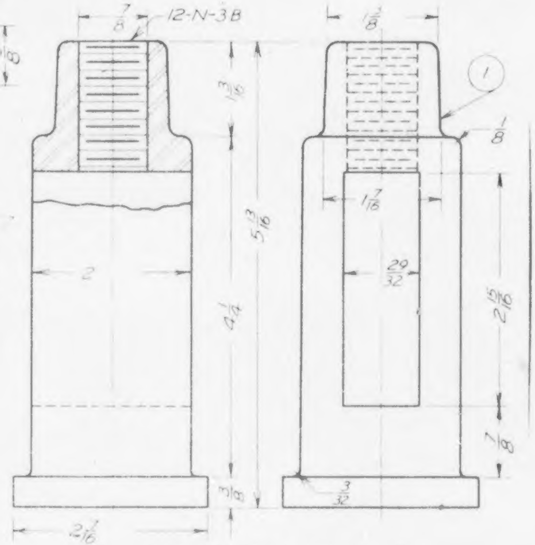




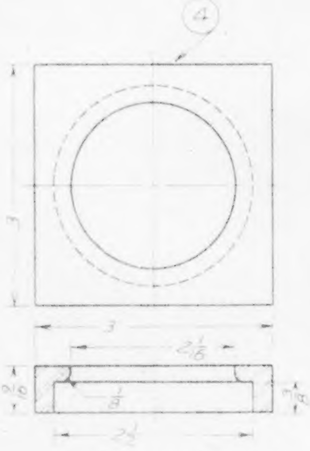
SCREW – Tool steel



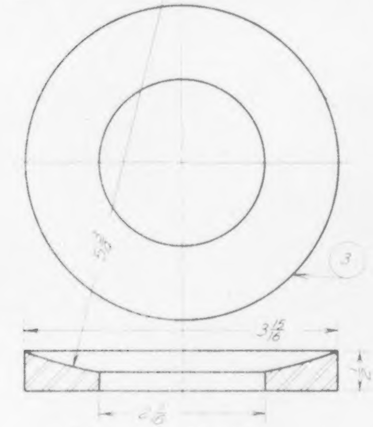
WEDGE – Steel forging



TOOL POST – Steel forging



BLOCK – Cold rolled steel



RING – Steel forging

BILL OF MATERIAL FOR TOOL POST

Piece Number	Name	Quan.	Mat.	Notes
1	BODY	1	S A E #1045	Forging
2	WEDGE	1	S A E #1045	Forging
3	RING	1	S A E #1045	Forging
4	BLOCK	1	S A E #1045	C R Steel 3 × 3 × 11/16
5	SCREW	1	S A E #1045	C R Steel 1" Dia × 3 15/16

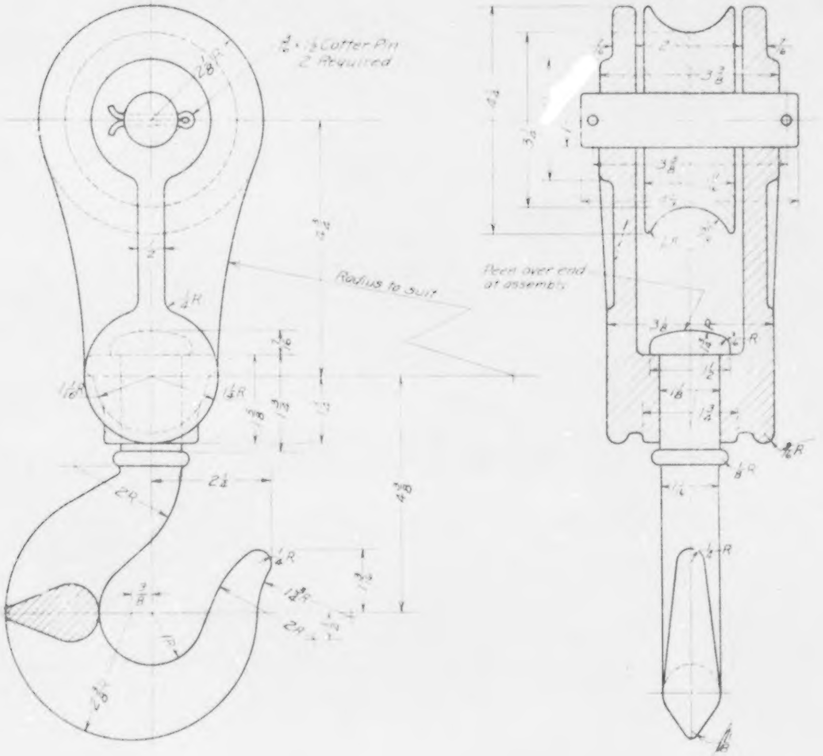
PROBLEM SHEET #11.22

BD Unit P Comp 2 of 2

UNIT: P Working Drawings

DIRECTIONS: Use 18 x 24 sheet of tracing paper and standard title block.

Make assembling drawing and complete bill of material.



QUIZ 19-Q

BD Unit P Comp 2 of 2

UNIT: P Working Drawings

10 points each

1. Name 3 factors that help determine the scale to be used on a drawing.

   a.

   b.

   c.

2. If an entire part is to be finished, what general note may be used?

3. When a surface is machined, what symbol is used?

4. The drawing showing how the parts fit together is called an ________ drawing.

5. What is another name for a parts list?

6. What dimensions should be shown on an assembling drawing?

7. After a drawing has been completed, what is the most important thing to be done.

8. T F Rounded corners and edges on unfinished machine parts are stronger than sharp corners.

ANSWER SHEET 19-Q

BD Unit P Comp 2 of 2

UNIT: P Working Drawings

10 points each

1. a. Size of paper
   b. Size necessary to get all dimensions on without crowding
   c. Size necessary to show all details clearly.
2. F.A.O. Finish All Over
3. Finish Mark V
4. Assembly
5. Bill of material
6. Overall size and location of matching parts.
7. Check the drawing
8. True

STUDENT COMPETENCY SHEET

BD Unit R Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: R Intersections and Developments

COMPETENCY STATEMENT: Draw the necessary intersections and developments of a series of given objects.

PERFORMANCE OBJECTIVE: Given basic drafting tools, glue, sissors, tape and quiz, you will be able to draw the necessary intersections and developments of a series of given objects. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

LEARNING ACTIVITIES:

1. Read chapter 18 pages 317-330 in "Mechanical Drawing" and be prepared to discuss.
2. Attend and participate in demonstration on surface developments and intersections by instructor.
3. Read directions and make cut outs of problems on problem sheets 18.1, 18.2 and 18.3.
4. Take written quiz 20-Q on surface developments and intersections. Must score a minimum of 90% correct.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

BD Unit R Comp 1 of 2

EVALUATION:

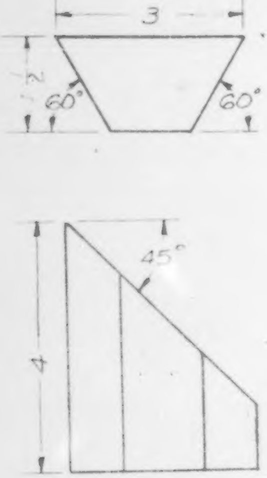
Given basic drafting tools, glue, sissors, tape and quiz, you will draw the necessary intersections and developments of a series of given objects. The drawings must meet the standards set forth in "Mechanical Drawing" and by the instructor.

PROBLEM SHEET #18.1

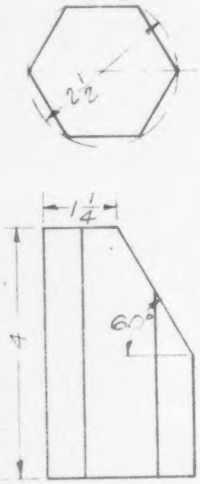
BD Unit R Comp 1 of 2

UNIT: R Intersections and Developments

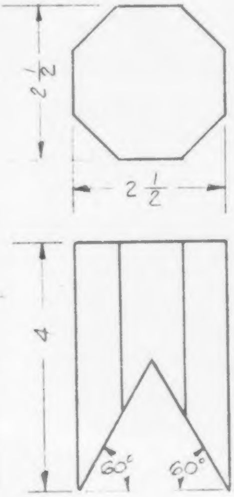
DIRECTIONS: Layout problems on 12 x 18 sheet of yellow paper. Cut each problem out and glue them together.



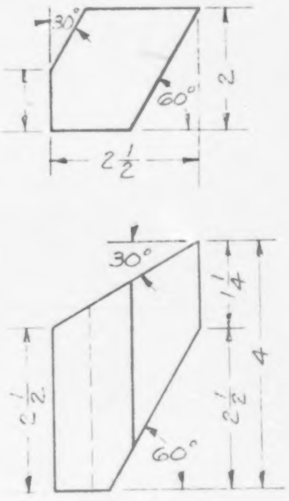
PROB. 18·1



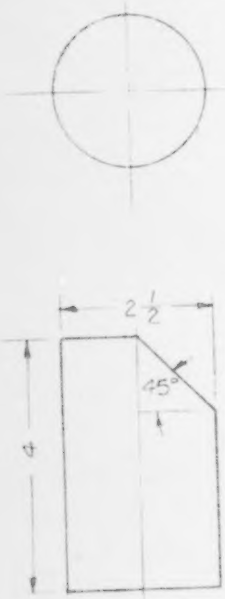
PROB. 18·2



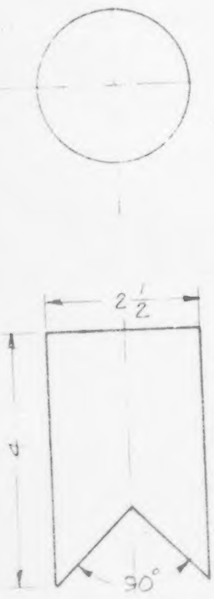
PROB. 18·3



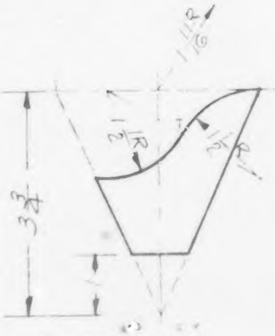
PROB. 18·4



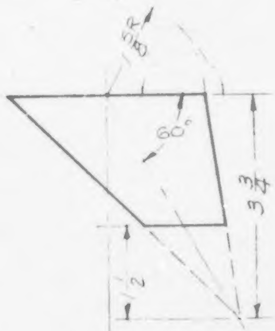
PROB. 18·5



PROB. 18·6



PROB. 18·7



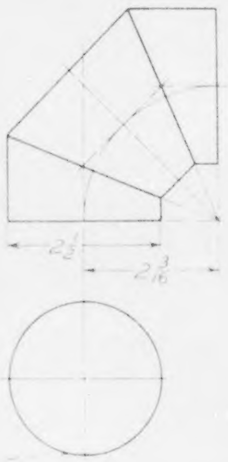
PROB. 18·8

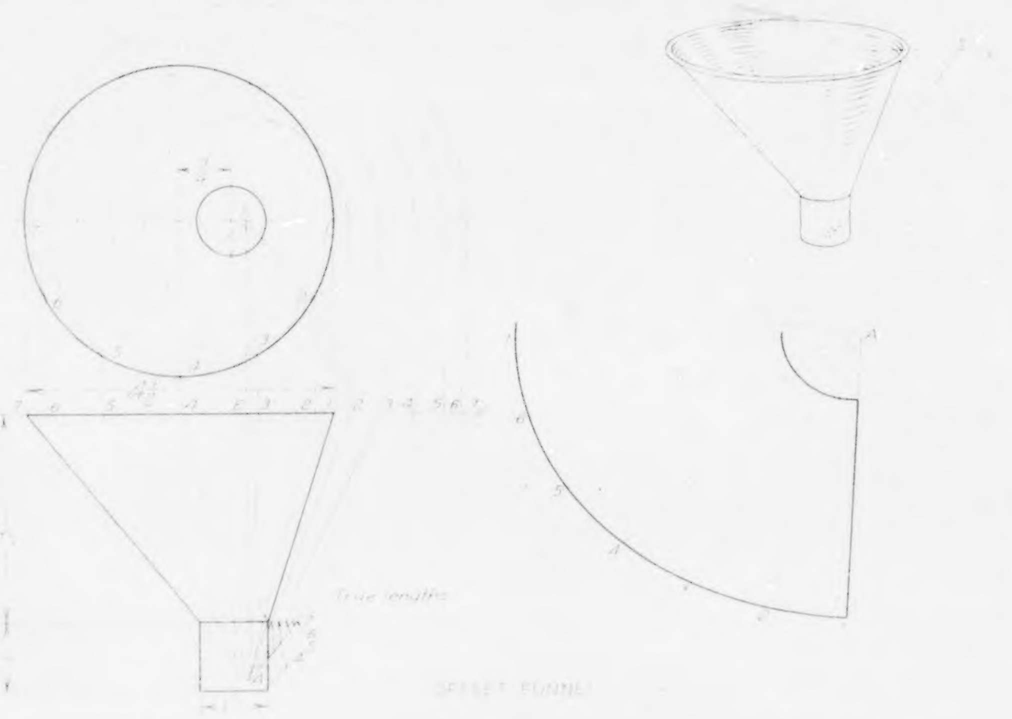
PROBLEM SHEET #18.2

BD Unit R Comp 1 of 2

UNIT: R Intersections and Developments

DIRECTIONS: Layout problems on 12 x 18 sheet of yellow paper. Cut each problem out and glue them together.





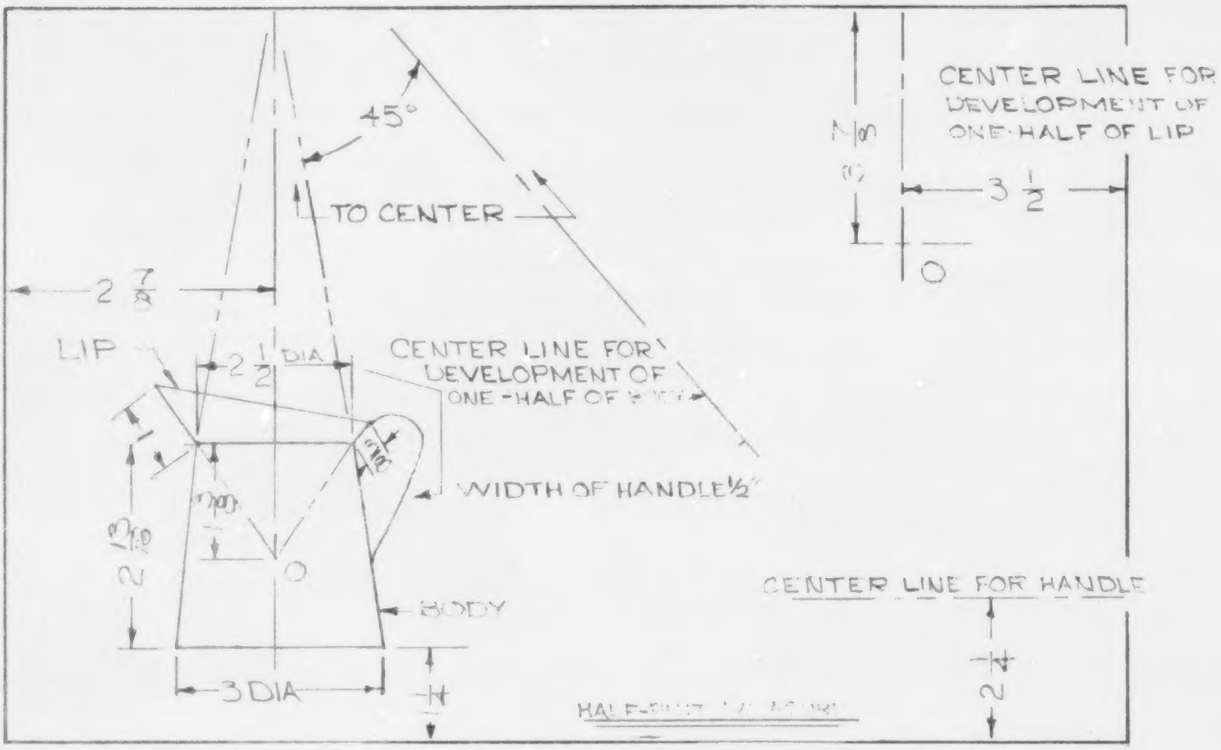
OFFSET FUNNEL

PROBLEM SHEET #18.3

BD Unit R Comp 1 of 2

UNIT: R Intersections and Developments

DIRECTIONS: Layout problems on 12 x 18 sheet of yellow paper. Cut each problem out and glue them together.


45°
TO CENTER
2 7/8
LIP
2 1/2 DIA
CENTER LINE FOR DEVELOPMENT OF ONE-HALF OF BODY
WIDTH OF HANDLE½"
O
BODY
3 DIA
CENTER LINE FOR DEVELOPMENT OF ONE-HALF OF LIP
3 1/2
O
CENTER LINE FOR HANDLE

QUIZ 20-Q

BD Unit R Comp 1 of 2

UNIT: R Intersections and Developments

20 points each

1. Name 2 objects constructed using parallel-line development:

   a.____________________ b.____________________

2. How many different classes of surfaces are there?
3. Define what an element is:

   ____

   ____

4. The top of a pyramid is called an ____________________.

ANSWER SHEET 20-Q

BD Unit R Comp 1 of 2

UNIT: R Intersections and Developments

20 points each

1. a. rectangle

   b. prism

2. a. plane

   b. curved

3. In the development of a cylinder, the cylinder is converted into a multi-sided prism and each edge of the prism is called an element.

4. Apex

STUDENT COMPETENCY SHEET

BD Unit S Comp 1 of 2

SPECIALIZATION: Basic Drafting

UNIT: S Cams

COMPETENCY STATEMENT: Know common terminology used on cam drawings.

PERFORMANCE OBJECTIVE: Given a quiz and references, you will be able to define the terms used on cam drawings with 90% accuracy.

LEARNING ACTIVITIES:

1. Read Chapter #19 pages 344-346 in "Mechanical Drawing" and be prepared to discuss.
2. Take written quiz 21-Q on cams. Must score a minimum of 90% correct.

EVALUATION:

Given a quiz and references, you will define the terms used on cam drawing with 90% accuracy.

QUIZ 21-Q

BD Unit S Comp 1 of 2

UNIT: S Cams

10 points each

1. List 5 different kinds of cams.

   a.

   b.

   c.

   d.

   e.

2. List 3 types of cam followers.

   a.

   b.

   c.

3. List 3 types of motion.

   a.

   b.

   c.

ANSWER SHEET 21-Q

BD Unit S Comp 1 of 2

UNIT: S Cams

10 points each

1. a. Plate cam
   b. Cylindrical cam
   c. Grooved cam
   d. Slider cam
   e. Offset plate cam
   f. Pivioted Roller cam
   g. Cylindrical edge cam
2. a. Roller follower
   b. Flat-surface follower
   c. Spring loaded follower
3. a. Uniform - motion
   b. Harmonic - motion
   c. Uniformly accelerated and decelerated motion.

STUDENT COMPETENCY SHEET

BD Unit S Comp 2 of 2

SPECIALIZATION: Basic Drafting

UNIT: S Cams

COMPETENCY STATEMENT: Calculate and draw uniform, harmonic and uniformly accelerated motion cams.

PERFORMANCE OBJECTIVE: Given basic drafting tools, references, size, rotation and motion data, you will be able to draw and calculate uniform, harmonic and uniformly accelerated motion cams with 100% accuracy.

LEARNING ACTIVITIES:

1. Read Chapter #19 pages 344 to 349 in "Mechanical Drawing" and be prepared to discuss.
2. Attend a demonstration, given by instructor, on cam motions.
3. Read directions and work problems on problem sheets #19.2.
4. If you have problems with learning activities 1-3, ask instructor for additional help.

EVALUATION:

Given basic drafting tools, references, size, rotation and motion data, you will draw and calculate uniform, harmonic and uniformly accelerated motion cams with 100% accuracy.

PROBLEM SHEET #19.2

BD Unit S Comp 2 of 2

UNIT: S Cams

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide the sheet into two equal parts. Place one of the following problems in each of the blocks. Calculate the missing data, dimension, label and layout the motion for each of the following cams.

19.10 Draw the layout for a cam with harmonic motion given the following information:

(a.) Rise 2"

(b.) Base circle - 4"

(c.) Rotation counter clockwise

(d.) Rise 2" with harmonic motion

(e.) Drop 2" with harmonic motion

(f.) Follower 1" diameter

(g.) Draw full scale

19.11 Draw the layout for a cam with uniform motion given the following information:

(a.) Base circle 4"

(b.) Follower 1" diameter

(c.) Rise 2"

(d.) Drop 2" with uniform motion

(e.) Rise 2" with uniform motion

(f.) Rotation counter clockwise

(g.) Draw full scale

PROBLEM SHEET #19.2 (con't)

BD Unit S Comp 2 of 2

UNIT: S Cams

DIRECTIONS: Use 12 x 18 sheet of drawing paper and divide the sheet into two equal parts. Place one of the following problems in each of the blocks. Calculate the missing data, dimension, label and layout the motion for each of the following cams.

19.12 Draw the layout for a cam with uniformly accelerated motion given the following information:

(a.) Rise 2 1/4" with uniformly accelerated motion.

(b.) Drop 2 1/4" with uniformly accelerated motion.

(c.) Rise 2 1/4"

(d.) Base circle 4"

(e.) Follower 1" diameter

(f.) Rotation counter clockwise

(g.) Draw full scale

19.13 Make drawing for plate cam given the data on figure below. Lay off the angles and draw radial lines from O. Draw the path of the roll centers. From E to D, dwell, radius 3 1/4 inches. From D to C, drop from 4 1/4 inches to 2 7/8 inches uniform motion. From C to B, drop from 2 7/8 to 2 inches with harmonic motion. From B to A, dwell, radius 2 inches. From A to F, Straight line. From F to E, radius of 1 3/4 inches as shown. Draw cam face using 1 inch diameter roller in sufficient number of positions to determine the outline. Keyway 1/4" to 1/8".

STUDENT COMPETENCY SHEET

BD Unit T Comp 1 of 3

SPECIALIZATION: Basic Drafting

UNIT: T Gears

COMPETENCY STATEMENT: Given the diametrical pitch, pitch diameter, number of teeth, and formulas for spur gears, you will be able to calculate and draw the required spur gears with 100% accuracy.

LEARNING ACTIVITIES:

1. Read Chapter #19 pages 349-356 in "Mechanical Drawing" and be prepared to discuss.
2. Study closely spur gear formulas on pages 352-353 in "Mechanical Drawing".
3. Read directions and work problems on problem sheets #19.20.
4. Take written quiz #22-Q.
5. If you have problems with learning activities 1-4, ask instructor for additional help.

EVALUATION:

Given diametrical pitch, pitch diameter, number of teeth, and formulas for spur gears, you will calculate and draw the required spur gears with 100% accuracy.

PROBLEM SHEET #19.20

BD Unit T Comp 1 of 3

UNIT: T Gears

DIRECTIONS:

19.22	(Problem 19.12)
19.23	(Problem 19.13)
19.24	(Problem 19.15)

QUIZ #22-Q

BD Unit T Comp 1 of 3

_____ Points Each

1. What does the term "working depth" mean? ______________________
2. If you had a spur gear with 24 teeth and a diametrical pitch of 4. What would be the pitch diameter? ________________
3. Define the term base circle: ______________________________
4. If you had a spur gear with a pitch diameter of 8 and the number of teeth were 32, what would the diametrical pitch be? ________
5. What is the difference between 4 1/2° pressure angle and a 20° pressure angle other than 5 1/2°? ______________________

ANSWER SHEET 22-Q

BD Unit T Comp 1 of 3

UNIT: T Gears

20 points each

1. The mating distance a tooth projects into the mating space.
2. 6
3. The circle from which the involute profile evolves.
4. 4
5. Determines the diameters of the base circles.

STUDENT COMPETENCY SHEET

BD Unit T Comp 2 of 3

SPECIALIZATION: Basic Drafting

UNIT: T Gears

COMPETENCY STATEMENT: Given the diametral pitch, pitch diameter, number of teeth, and formulas for spur gears you will be able to perform the following:

a. calculate the dimensions of a spur gear.

b. correctly construct a spur gear using simplified representation.

Your performance will be evaluated in accordance with the instructor's checklist.

LEARNING ACTIVITIES:

1. Read chapter #19 pages 349-356 in "Mechanical Drawing" and be prepared to discuss.
2. Read directions and work problems on problem sheet #19.30 and #19.31.
3. If you have problems with learning activities 1-2, ask instructor for additional help.

EVALUATION:

Given the diametrical pitch, pitch diameter, number of teeth, and formulas for spur gears, you will perform the following:

a. calculate the dimensions of a spur gear.

b. correctly construct a spur gear using simplified representation.

PROBLEM SHEET #19.30

BD Unit T Comp 2 of 3

UNIT: T Gears

DIRECTIONS: Draw a spur gear with a 14 1/2° pressure angle using the simplified representation.

a. Prepare your paper using the proper layout.

b. Given the following information:

PD = 12 Hub diameter = 2"

N = 48 Shaft Diameter = 1"

c. Find the necessary information to draw a spur gear.

d. Draw a spur gear with a 14 1/2° pressure angle using the simplified method. Use a scale of 1/2" = 1".

e. Construct a cutting data block and list your information obtained in c.

PROBLEM SHEET #19.31

BD Unit T Comp 2 of 3

UNIT: T Gears

DIRECTIONS:

Draw a spur gear with a 20° pressure angle using the simplified representation.

a. Prepare your paper using the proper layout.

b. Given the following information:

PD = 12 Hub diameter = 2"

DP = 3 Shaft diameter hole = 1"

c. Find the necessary information to draw a spur gear.

d. Draw a spur gear with a 20° pressure angle using the simplified method. Use a scale of 1/2" = 1".

e. Construct a cutting data block and list your information obtained in c.

PART II

TECHNICAL ILLUSTRATION

STUDENT COMPETENCY SHEET

TI Unit A Comp 1 of 1

SPECIALIZATION: Technical illustration

UNIT: A What is technical illustration?

COMPETENCY STATEMENT: Demonstrates knowledge of why technical illustration drawings are made.

PERFORMANCE OBJECTIVE: Given a list of questions about why technical illustration drawings are made and no references, you will be able to answer the questions in writing with 80% accuracy.

LEARNING ACTIVITIES:

1. Read pages 1-18 in "Technical Illustration" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor on "What is Technical Illustration".
3. If you have problems with activities 1 & 2 ask the instructor for help and additional activities if needed.

EVALUATION:

Given a list of questions about why technical illustration drawings are made and no references, you will answer the questions in writing with 80% accuracy.

QUIZ 1-C

TI Unit A Comp 1 of 1

SPECIALIZATION: Technical illustration

UNIT: A What is technical illustration?

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. Define Technical Illustration.
2. What are some of the uses of Technical Illustration?
3. Name two distinct divisions of Technical Illustration.
4. What is the difference between these too?
5. What are exploded drawings?
6. What are the basic steps for preparing an illustration?
7. What is meant by twice up?
8. What is IPB?
9. What is a rough or construction drawing?

STUDENT COMPETENCY SHEET

TI Unit B Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: B Freehand Technical Sketching

COMPETENCY STATEMENT: Make freehand sketches of given objects.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment, you will be able to make freehand sketches of a given series of basic objects. References may be used.

LEARNING ACTIVITIES:

1. Read pages 19-24 "Technical Illustration" and be prepared to discuss.
2. Observe and participate in demonstration, given by the instructor on making freehand sketches of basic objects.
3. Read the directions and complete the problems assigned by the instructor on pages 30-34 "Technical Illustration".
4. Take written Quiz 2-Q on freehand technical sketching. You must score a minimum of 80%. No references may be used.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will make freehand sketches of a given series of basic objects. References may be used.

QUIZ 2-B

TI Unit B Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: B Freehand Technical Sketching

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.
NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. Why is Technical sketching important?
2. With whom does the technical illustrator work.
3. What kind of pencil is recommended for sketching?
4. What mechanical aids are sometimes used in freehand sketching?
5. What is meant by bowing in?
6. What are the main purposes of a freehand sketch?

STUDENT COMPETENCY SHEET

TI Unit C Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: C Isometric Drawing

COMPETENCY STATEMENT: Makes isometric drawings of given objects.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment, you will be able to make a series of isometric drawings of a series of basic objects. References may be used.

LEARNING ACTIVITIES:

1. Read pages 25-34 "Technical Illustration" and be prepared to discuss.
2. Observe and participate in demonstration given by the instructor on isometric drawings of basic objects.
3. Read the directions and do the problems assigned by the instructor on pages 30-34 "Technical Illustration". Present each drawing to your instructor for evaluation. The problems must be done with 100% accuracy.
4. Take a written Quiz 3-Q on isometric drawings. You must score a minimum of 80%. No references may be used.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will make a series of isometric drawings of a series of basic objects. References may be used.

QUIZ 3-C

TI Unit C Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: C Isometric Drawing

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. Define isometric drawing.
2. Name three types of isometric drawings.
3. What foreshortened scale is used when making an isometric projection
4. Explain bosing in method of construction.
5. What type isometric is used to show the bottom of an object?
6. What are isometric lines?
7. What are non-isometric lines?

STUDENT COMPETENCY SHEET

TI Unit E Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: E Basic Techniques, Intersections and Sections

COMPETENCY STATEMENT: Demonstrates knowledge of Basic Techniques and Procedures used in Technical Illustrations.

PERFORMANCE OBJECTIVES: Given the necessary materials and equipment you will be able to make a series of basic objects. References may be used.

LEARNING ACTIVITIES:

1. Read pages 48-67 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstrations given by the instructor on basic techniques, insections and sections.
3. Read the directions and do the problems assigned by the instructor. The problems must be 100% accurate.
4. Take written Quiz 5-Q on Techniques, Intersections and Sections. You must score a minimum of 80%. No references may be used.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will make a series of basic objects. References may be used.

QUIZ 5-9

TI Unit E Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: E Basic Techniques, Intersections and Sections

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. What is the shape of a sphere in a three-dimensional drawing?
2. What problem appears when drawing a view of a cylinder which has a rectangular-shaped end?
3. What method of construction is used for drawing irregular shaped objects?
4. Explain how angles are drawn without the aid of a protractor.

STUDENT COMPETENCY SHEET

TI Unit F Comp 1 of 2

SPECIALIZATION: Technical Illustration

UNIT: F The Ellipse as a Measuring Device

COMPETENCY STATEMENT: Demonstrates knowledge in the use of the ellipse template as a measuring device.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to do a series of basic objects using the ellipse as a measuring device. References may be used.

LEARNING ACTIVITIES:

1. Read pages 74-88 "Technical Illustrations" and be prepared for a class discussion.
2. Attend a lecture given by the instructor on "The Ellipse as a Measuring Device".
3. Read the directions and complete the problems assigned by the instructor.
4. Take written Quiz 6-Q on The Ellipse as a Measuring Device. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will do a series of basic objects using the ellipse as a measuring device.

QUIZ 6-9

TI Unit F Comp 1 of 2

SPECIALIZATION: Technical Illustration

UNIT: F The Ellipse as a Measuring Device

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. Explain how the ellipse can be used for measuring nonisometric lines.
2. Describe three ways to divide an ellipse into equal parts.
3. Name the technique for measuring angles with the ellipse.
4. Describe the concentric-ellipse method for dividing an ellipse into equal parts.

STUDENT COMPETENCY SHEET

TI Unit F Comp 2 of 2

SPECIALIZATION: Technical Illustration

UNIT: F Isometric Ellipse Protractor

COMPETENCY STATEMENT: Demonstrates knowledge of the use of the Isometric Ellipse Protractor.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to demonstrate your knowledge of the use of the isometric ellipse protractor by drawing a series of basic objects.

LEARNING ACTIVITIES:

1. Read pages 68-73 "Technical Illustrations" and be prepared to discuss.
2. Attend a lecture given by the instructor on the isometric ellipse protractor.
3. Read the directions and do the problems assigned by the instructor on pages 87-88 "Technical Illustrations". Present each drawing to your instructor for evaluation.
4. Take written Quiz 7-Q isometric ellipse protractors. You must score a minimum of 80% No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will demonstrate your knowledge of the use of the isometric ellipse protractor.

QUIZ 7-G

TI Unit F Comp 2 of 2

SPECIALIZATION: Technical Illustration

UNIT: F Isometric Ellipse Protractor

20 Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST MAKE A MINIMUM SCORE OF 80%

1. Explain the three parts of the lietz isometric ellipse protractor.
2. How do you align the protractor?
3. What is the required first step when using the protractor to find the proper angle-size ellipse for a nonisometric plane?
4. Explain the procedure for finding a compound angle with the protractor.
5. What part of the protractor is used to find the angle-size ellipse for a compound surface?

STUDENT COMPETENCY SHEET

TI Unit G Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: G Layout and Construction Methods

COMPETENCY STATEMENT: Demonstrates knowledge in layout and construction methods.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to draw a series of problems using the proper layout and construction methods. References may be used.

LEARNING ACTIVITIES:

1. Read pages 98-112 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstration given by the instructor on proper layout and construction methods.
3. Read the directions and do the problems assigned by the instructor. These must be done with 100% accuracy.
4. Take written Quiz 8-Q on layout and construction methods. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will draw a series of basic objects using the layout and construction methods. References may be used.

QUIZ 8-G

TI Unit G Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: G Layout and Construction Methods

____Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%.

1. Define layout.
2. What is primary importance in making a layout?
3. Describe the procedure for boxing in.
4. Name several layout patterns for technical illustrations.
5. Describe two methods for drawing a gear.
6. What basic point should be kept in mind when locating exploded parts on an illustration?
7. What are flou lines? Give another name for these lines.
8. What is an index number?
9. Give three examples of leaders.
10. Explain how leaders are drawn.
11. What is a spot detail? Give three examples.
12. What is the use of a spot enlarger?
13. Explain how to divide a line into four equal parts with the proportional dividers.
14. Explain how to divide the circumference of a circle into four equal parts with the proportional dividers.

STUDENT COMPETENCY SHEET

TI Unit H Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: H Dimetric and Trimetric drawing

COMPETENCY STATEMENT: Demonstrates knowledge of dimetric and trimetric drawings.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to draw dimetric and trimetric drawings.

LEARNING ACTIVITIES:

1. Read pages 135-148 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor on dimetric and trimetric drawings.
3. Read the directions and follow the instructions for the problems assigned by the instructor.
4. Take written Quiz 9-Q on dimetric and trimetric drawings. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will make dimetric and trimetric drawings.

QUIZ 9-9

TI Unit H Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: H Dimetric and Trimetric drawing

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%.

1. What is the main difference between a dimetric drawing and an isometric drawing?
2. Define a dimetric drawing.
3. Define a trimetric drawing.
4. Given two different dimetric axes that represent horizontal surfaces.
5. What is an advantage of a dimetric drawing? Trimetric?
6. What is a disadvantage of a dimetric drawing? Trimetric?
7. What is shown on a dimetric grid?
8. Is the foreshortened scale the same for all dimetric drawings? Explain.

STUDENT COMPETENCY SHEET

TI Unit I Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: I Fasteners and Springs

COMPETENCY STATEMENT: Demonstrates knowledge in the use of templates in drawing fasteners and springs.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to draw a series of basic objects. References may be used.

LEARNING ACTIVITIES:

1. Read pages 89-97 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstrations given by the instructor on using the ellipse and hexagon templates.
3. Read the directions and do the problems assigned by the instructor These must be done with 100% accuracy.
4. Take written Quiz 10-Q on fasteners and springs. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will make a series of basic drawings.

QUIZ 10-Q

TI Unit I Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: I Fasteners and Springs

10 Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. What diameter-size ellipse is used to draw a simplified hexagon?
2. What is the thickness of a hexagon-head bolt?
3. What is the thickness of a hexagon nut?
4. How do you determine the location of a hexagon corner when using the simplified method of construction?
5. When drawing a simplified hexagon on a nonisometric surface, what diameter size ellipse is used? Explain.
6. What angle-size ellipse is used to draw the chamfer on a square nut?
7. When should the notch in a fillister head be drawn with only a single line?
8. Describe a simplified method for drawing a round-head bolt or rivet.
9. Explain a practical method for spacing the threads on a bolt.
10. How would you draw a left-hand spring using the spring template.

STUDENT COMPETENCY SHEET

TI Unit J Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: J Perspective Drawing

COMPETENCY STATEMENT: Demonstrates knowledge of perspective drawings.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to draw a series of one and two point perspectives.

LEARNING ACTIVITIES:

1. Read pages 121-134 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstrations given by the instructor on perspective drawing.
3. Read the directions and do the problems assigned by the instructor.
4. Take written Quiz 11-Q on perspective Drawing. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will draw a series of one and two point perspectives.

QUIZ 11-C

TI Unit J Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: J Perspective Drawing

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

YOU MUST SCORE A MINIMUM OF 80%. NO REFERENCES MAY BE USED.

1. Define perspective drawing.
2. What is the main difference between perspective drawing and methods previously discussed?
3. Define picture plane, eye level, station point, and vanishing point.
4. Name three types of perspective.
5. Describe the plan-view method.
6. Describe the measuring line method.
7. What mechanical aid is widely used to make perspective drawings?
8. Why is mechanical perspective seldom used in technical illustrations?
9. Where would you place an object in perspective if the bottom surface were to be shown?
10. What is the main disadvantage of mechanical perspective drawing? Advantages?
11. Is it possible to use a scale when drawing in perspective?

STUDENT COMPETENCY SHEET

TI Unit K Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: K Shading techniques and photo retouching

COMPETENCY STATEMENT: Demonstrates knowledge of shading techniques and photo retouching

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to do a series of drawings using the proper shading techniques.

LEARNING ACTIVITIES:

1. Read pages 149-153 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstration given by the instructor on shading techniques and photo retouching.
3. Read the directions and complete the problems assigned by the instructor.
4. Take written Quiz 12-Q on shading techniques and photo retouching. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will do a series of drawings using the proper shading techniques.

QUIZ 12-G

TI Unit K Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: K Shading techniques and photo retouching

10 Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. What type of shading is used in most technical illustrations?
2. What commercial products are sometimes used for shading?
3. How are exterior lines of an object shaded?
4. What part of a shaft of bolt is shaded?
5. How are holes shaded?
6. What type of pencil point is suggested for shading?
7. What is meant by smudge shading?
8. What is photo retouching and how is it accomplished?
9. Describe a special method sometimes used in pencil shading.
10. What method of line delineation is used when one line of an object extends behind another line?

STUDENT COMPETENCY SHEET

TI Unit L Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: L Oblique Drawings

COMPETENCY STATEMENT: Demonstrates knowledge of oblique drawings

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to do a series of oblique drawings.

LEARNING ACTIVITIES:

1. Read pages 154-156 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in demonstration given by the instructor on oblique drawings.
3. Read the directions and complete the problems assigned by the instructor.
4. Take written Quiz 13-Q on oblique drawings. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will do a series of oblique drawings.

QUIZ 13-C

TI Unit L Comp 1 of 1

SPECIALIZATION: Technical Illustrations

UNIT: L Oblique Drawings

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

YOU MUST SCORE A MINIMUM OF 80%. NO REFERENCES MAY BE USED.

1. What is an advantage of oblique drawing? A disadvantage?
2. What is an oblique drawing called when made with a receding axis at 45°?
3. Define a cabinet drawing.
4. What is the purpose of foreshortening dimensions on an oblique drawing?
5. What oblique method should be used when drawing a long shaft?
6. When does distortion appear the greatest in oblique drawing?
7. On what plane of oblique drawing are details of an object drawn in true shape?

STUDENT COMPETENCY SHEET

TI Unit M Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: M Inking Methods and equipment

COMPETENCY STATEMENT: Demonstrates knowledge of the proper inking methods.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to use the proper inking methods.

LEARNING ACTIVITIES:

1. Read pages 157-160 "Technical Illustrations".
2. Observe and participate in demonstration given by the instructor on proper inking methods.
3. Read the directions and complete the problems assigned by the instructor.
4. Take written Quiz 14-Q on inking methods. You must score a minimum of 80%. No references may be used.
5. If you have any problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will use the proper methods of inking.

QUIZ 14-Q

TI Unit M Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: M Inking Methods and Equipment

10 Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

YOU MUST SCORE A MINIMUM OF 80%. NO REFERENCES MAY BE USED.

1. Name three mechanical pens used for inking lines.
2. Given the names of two special letter devices.
3. Describe several methods used to avoid smearing lines when using mechanical aids.
4. Name four speedball pen points.
5. What is the main use of speedball pen points?
6. Name three materials on which inked drawings are made.
7. What is the suggested order of inking straight lines and arcs?
8. What are the main qualifications for a good inker?
9. What is used to clean inking pens?
10. Describe the procedure used for inking a pencil illustration.

STUDENT COMPETENCY SHEET

TI Unit P Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: P The Ellipse and Hexagon Templates

COMPETENCY STATEMENT: Demonstrates knowledge of the use of ellipse and hexagon templates.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to make three dimensional drawings of a series of basic objects. References may be used.

LEARNING ACTIVITIES:

1. Read pages 35-47 "Technical Illustrations" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor on using the ellipse and hexagon templates.
3. Read directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
4. Take written Quiz 4-Q on the ellipse and hexagon templates. You must score a minimum of 80%. No references may be used.
5. If you have any questions about the activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the materials and equipment you will make three dimensional drawings of a series of basic objects. References may be used.

QUIZ 4-C

TI Unit P Comp 1 of 1

SPECIALIZATION: Technical Illustration

UNIT: P The Ellipse and Hexagon Templates

___Points each

ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER.

NO REFERENCES MAY BE USED. YOU MUST SCORE A MINIMUM OF 80%

1. What is the main use of the ellipse template?
2. What is the major axis? Minor axis?
3. Name two types of ellipse templates.
4. What is the main difference between these two templates?
5. What is the most important fact to remember when using the ellipse template?
6. What determines the proper angle-size ellipse?
7. How can you determine the minor axis of an ellipse?
8. Name two important parts of a hexagon.

PART III

ARCHITECTURE

STUDENT COMPETENCY SHEET

Arch Unit A Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: A Techniques

COMPETENCY STATEMENT: Uses architectural techniques.

PERFORMANCE OBJECTIVE: Given a series of drawing problems you will demonstrate the ability to use proper line work.

LEARNING ACTIVITIES:

1. Read Chapter 6, page 42 "Architectural Drafting and Design" and prepare classroom illustration showing the five types of architectural line techniques.
2. List recommended pencil grade for the alphabet of lines.
3. List several methods to keep drawings free of smudges.
4. List two techniques not listed in your text.

EVALUATION:

Given a series of drawing problems you will demonstrate the ability to use proper line work. All line work must correspond to page 43 of your text "Architectural Drafting and Design".

STUDENT COMPETENCY SHEET

Arch Unit B Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: B Symbols

COMPETENCY STATEMENT: Identifies symbols used to represent content of architectural drawing.

PERFORMANCE OBJECTIVE: Given the necessary materials, the student will be able to identify the symbols used to represent the content on a set of architectural plans. No references may be used and 90% accuracy is required. All symbols must meet the standards of "Time Saver Standards".

LEARNING ACTIVITIES:

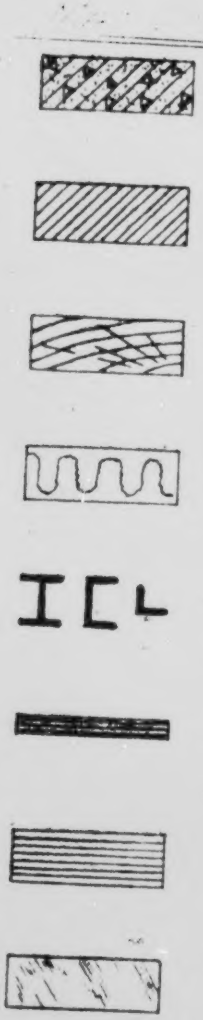
1. Learn symbols on pages 104-109, 253, and 258.
2. Review several sets of house plans your instructor may have.
3. On page 121 answer questions 1-25 using the set of working drawings in the chapter (Chapter 4-102).
4. Take test "Symbols".
5. Apply correct symbols to your house plans.

EVALUATION:

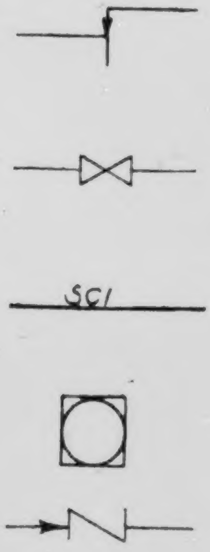
The student will perform with 90% accuracy, using no references, on exam "Symbols". All work must meet the standards of "Time Saver Standards" 5th Edition.

HANDOUT SHEET #301

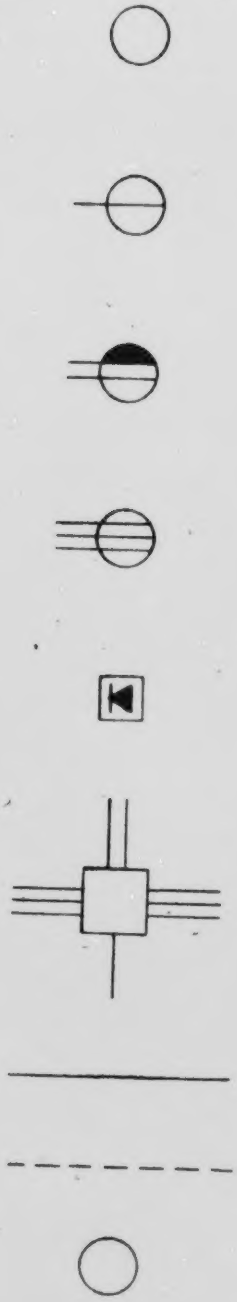
Arch Unit B Comp 1 of 1

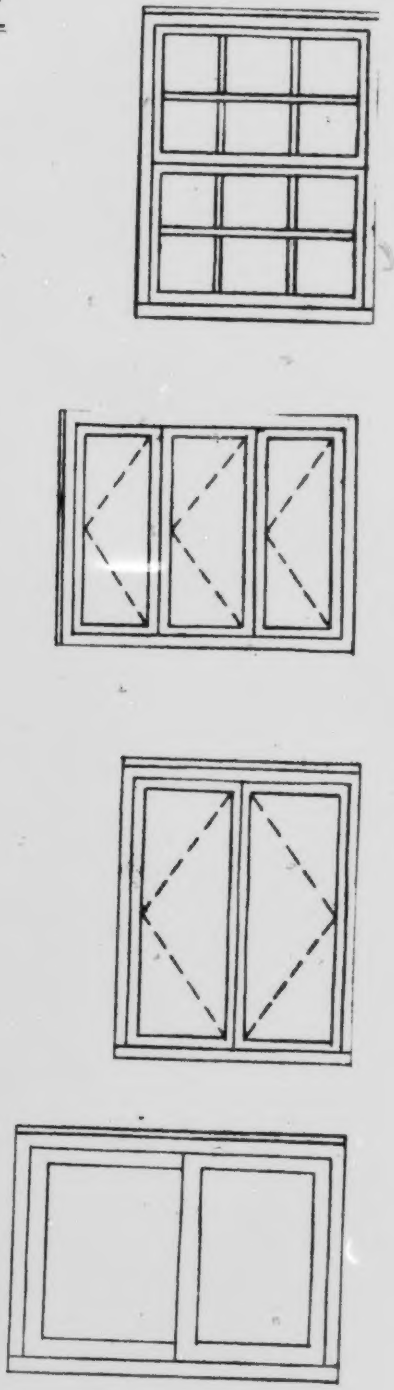


PLUMBING



ELECTRICAL





STUDENT COMPETENCY SHEET

Arch Unit C Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: C Lettering

COMPETENCY STATEMENT: Uses the standard freehand block method to letter the alphabet.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to letter, block style, the alphabet and chosen sentences. The student may use any reference within the classroom. Lettering must conform to the standards set by the instructor.

LEARNING ACTIVITIES:

1. You will obtain lettering transparencies from instructor and review until you are confident you understand the necessary lettering strokes. Discuss with the instructor any questions you may have.
2. You are to read the section on lettering, Chapter 4 of your text. "Architecture Drawing", pages 95-96 and make a copy of fig. 284.
3. Obtain from your instructor the necessary paper and instructions and letter a lettering sheet.
4. Compare your lettering sheet with the examples your instructor has. Have the instructor go over your lettering sheet with you and discuss any difficulty.

STUDENT COMPETENCY SHEET (CON'T)

Arch Unit C Comp 1 of 1

EVALUATION:

The student will letter a lettering sheet - 12 x 18 - using any reference material in the classroom. Lettering must conform to the standards established by the instructor.

STUDENT COMPETENCY SHEET

Arch Unit D Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: D Use of References

COMPETENCY STATEMENT: Locates information in "Architectural Graphic Standards".

PERFORMANCE OBJECTIVE: Given the book "Architectural Graphic Standards", student will be able to locate specific information.

LEARNING ACTIVITIES:

1. Attend lecture given by the instructor.
2. Make a list of the table of contents.
3. Read and be able to discuss the information contained in the preface and foreword of "Architectural Graphic Standards".
4. Complete Handout Sheet #302 on specific information to be found in the "Architectural Graphic Standards".

EVALUATION:

You will find teacher specified information in the "Architectural Graphic Standards". You may not use any reference and a score of 90% is required.

HANDOUT SHEET #302

Arch Unit D Comp 1 of 1

LOCATE THE FOLLOWING QUESTIONS
IN THE "ARCHITECTURAL GRAPHIC STANDARDS"

1. On what page would I find the dimensions of the human figure? What is the height of an average man?
2. Can I find Commercial Kitchen Equipment layouts in the "Architectural Graphic Standards"? If no thru-traffic, minimum width of aisles are what?
3. On what page/pages can I find a checklist for subdivision plot plans?
4. What is the average depth of frost penetration in inches for our area?
5. In determining sewage disposal systems for residential building, what is the average, in gallons per person, of sewage per day?
6. In plumbing piping, what is the symbol for fire line, indirect drain, and vent?
7. On what pages may I find information on casement windows?
8. What is the application method used for drywall 1/2 thick?
9. When using J8L Junior beams with a total load 80 PS1, 16" O.C., how many feet may I span?
10. What is the recommended slope on 4" sewer tile in less than 100 feet of run?

QUIZ 2-8

Arch Unit E Comp 1 of 7

BUILDING SITE

1. What are "Building Codes"?
2. How will the tax structure affect your building site selection?
3. Explain "zoning".
4. List two points to be considered when studying zoning.
5. Name 6 factors to look for when choosing a building site - disadvantages.
6. Give two examples of why building site size is important.
7. Why are the types of existing residence important in site selection?
8. What about the value of surrounding houses? How does it effect selection of a site?
9. What is one big disadvantage of a flat lot?
10. Give two advantages of a sloping lot.
11. Give two disadvantages of a sloping lot.
12. What is considered excellent thickness of topsoil?
13. Why should recently filled building sites be avoided?
14. What building site conditions should be considered if a basement is desired?
15. Explain the term "Easement".
16. What basic house types are suited to gently sloping lots?
17. Explain the importance of a "Deed".

Arch Unit E Comp 1 of 7

18. Name three organizations, other than local building codes, whom require minimum acceptable requirements for houses and building sites.

STUDENT COMPETENCY SHEET

Arch Unit E Comp 1 of 7

SPECIALIZATION: Architecture

UNIT: E Home Building Site

COMPETENCY STATEMENT: Knowledge to determine house and proper building site.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment, the student will be able to pass an exam with 90% accuracy determining proper building sites and how the house will relate. No references may be used on the exam. All work shall meet basic rule on building sites as listed on page 14 of the text.

LEARNING ACTIVITIES:

1. Make a list of considerations that need to be made before buying a building site.
2. Examine local building codes for your area to see how they will influence the house.
3. Look for a lot which will fit your desired house design. Discuss it with a realtor and the merits and drawbacks of various lots for sale.
4. Take Quiz 2-Q

EVALUATION:

The student will pass an exam with 90% accuracy on building sites. No references can be used. All work must meet the standards of the text.

STUDENT COMPETENCY SHEET

Arch Unit E Comp 2 of 7

SPECIALIZATION: Architecture

UNIT: E Plot Plan

COMPETENCY STATEMENT: Demonstrates knowledge of plot plan drawings.

PERFORMANCE OBJECTIVE: Given the necessary materials, the student will be able to demonstrate a knowledge of plot plan drawings. The student will be able to pass an exam with 90% accuracy, without the use of references. All work must conform to standards of your textbook, pages 15-20.

LEARNING ACTIVITIES:

1. Read Chapter 1, pages 15-20. Write down any questions you may have.
2. Attend lecture given by the instructor.
3. Study Handout Sheet #303.
4. Take 3-Q "Plot Plan".
5. Draw a plot plan for your house. Make up the existing and new contours using examples in your textbook.

EVALUATION:

The student will pass an exam with 90% accuracy using no references. All work must agree with your text.

Arch Unit E Comp 2 of 7

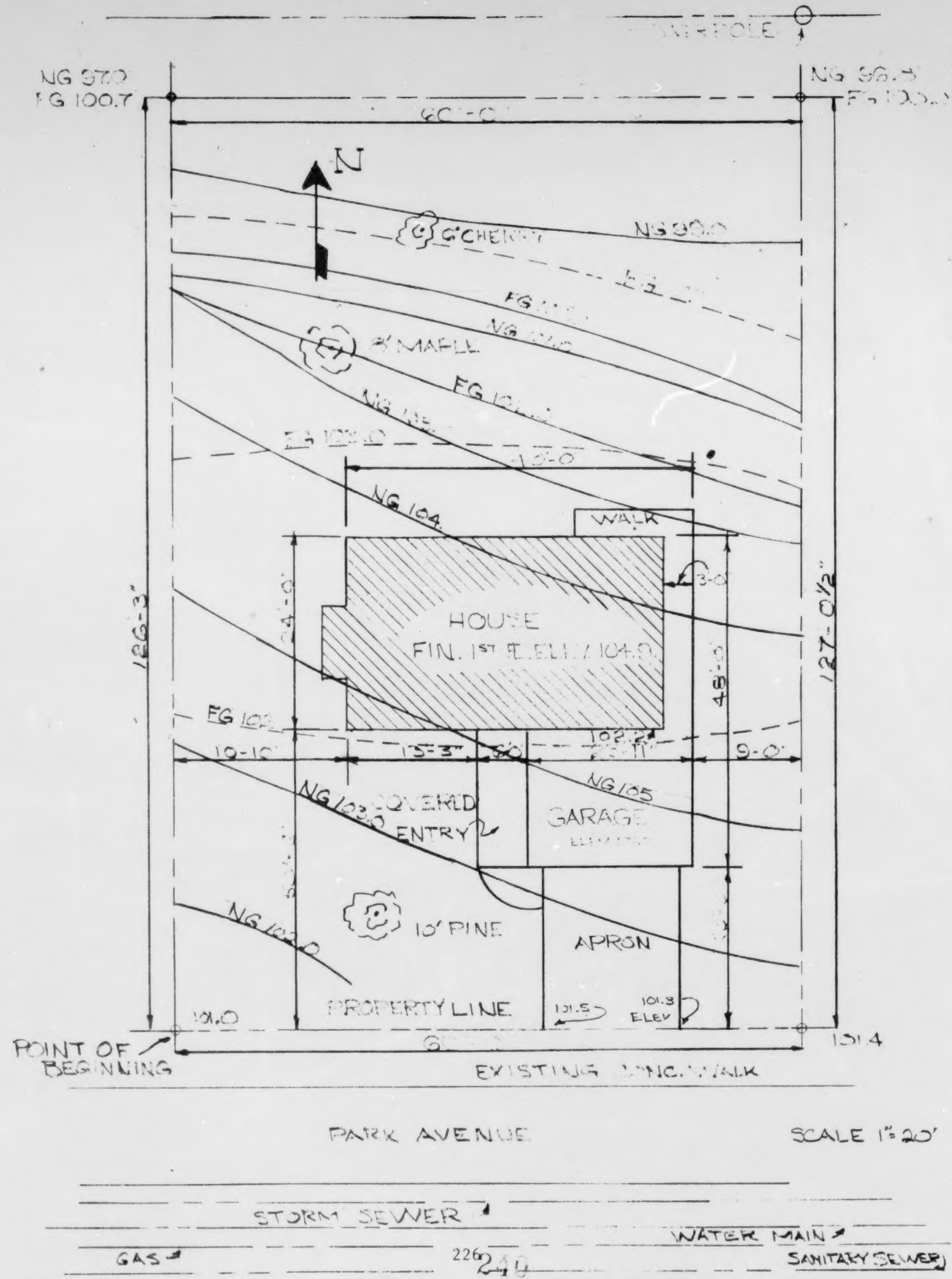
ARCHITECTURAL GRAPHICS

PLOT PLAN

Plot Plans are used to show the location and size of all buildings on the lot. Overall building dimensions and lot dimensions are shown on plot plans. Losted below are a few suggestions for making this type of drawing.

GUIDELINES FOR DRAWING PLOT PLANS

1. Draw only the outline of the house.
2. Draw the outlines of other buildings on the lot.
3. Show overall building dimensions.
4. Locate each building by dimensioning from the property line to the building.
5. Show position and size of driveways.
6. Show location and size of walks.
7. Indicate grade elevations.
8. Indicate material used on sidewalks, driveways, etc.
9. Label streets adjacent to the outline.
10. Place overall lot dimensions directly on property line.
11. Indicate compass orientation of the lot by the use of a north arrow.
12. Use a decimal scale such as 1/10" = 1'-0".
13. Indicate sewer, water, and gas lines on the plan.
14. Show position of electric poles and the location at which the power line enters the house.


POWER POLE
NG 97.0
FG 100.7
NG 96.5
FG 100.5
60'-0"
N
6' CHERRY
NG 99.0
FG
FG
NG
8' MAPLE
FG 102
NG 102
FG 102.0
40'-0"
NG 104
WALK
3'-0"
HOUSE
FIN. 1ST FL. ELEV. 104.0
24'-0"
48'-0"
126'-3"
127'-0½"
FG 102
102.2
10-10"
15'-3"
8'0"
23'-11"
9'-0"
NG 105
NG 103.0
COVERED
ENTRY
GARAGE
10' PINE
APRON
NG 102.0
PROPERTY LINE
101.0
101.5
101.3
ELEV
101.4
60'
POINT OF
BEGINNING
EXISTING CONC. WALK
PARK AVENUE
SCALE 1"=20'
STORM SEWER
WATER MAIN
GAS
SANITARY SEWER

QUIZ 3-Q

Arch Unit E Comp 2 of 7

PLOT PLAN

1. Where does the elctric power supply come from?
2. Where are the water, gas, and sewer mains located?
3. How much slope does the garage floor have?
4. What is the finished grade around the house?
5. Are the North and South lot lines parallel?
6. What is the natural slope of the ground?
7. What is the highest point of the lot in its original condition?
8. What is the finished floor elevation?
9. What is the difference between finished first floor and the garage floor level?
10. What is the lowest point of the lot in its original condition?
11. What is the reference elevation?
12. What is a datum level?
13. How are the dimensions shown?
14. What is the distance of the house from the South property line?
15. What is the width of the house?
16. What is the scale of this plot plan?
17. What type of trees are on this lot?
18. What is the width of the entry passage?
19. Who is responsible for a certified plot plan?
20. What are the dimensions of this lot?

STUDENT COMPETENCY SHEET

Arch Unit E Comp 3 of 7

SPECIALIZATION: Architecture

UNIT: E Building Considerations

COMPETENCY STATEMENT: Lists the factors that should be considered before building a house.

PERFORMANCE OBJECTIVE: Before beginning your house plan you will list the factors that should be considered before building a house. Answers must be based on Handout Sheet "Considerations" from page 39 "Architectural Drafting and Design".

LEARNING ACTIVITIES:

1. Read Chapters 1 and 2 in "Architectural Drawing and Design" and complete Handout Sheet #304 "Considerations".
2. Sketch your floor plan using the list you have completed. Submit it to your instructor.

EVALUATION:

You will list the factors that should be considered before building a house. All answers are based on hand out and no references may be used.

STUDENT COMPETENCY SHEET

Arch Unit E Comp 4 of 7

SPECIALIZATION: Architecture

UNIT: E Interior Design

COMPETENCY STATEMENT: Determines traffic patterns and uses good space utilization.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to plan the floor layout using good traffic patterns and wise use of available space. The student may use any references within the classroom. All work must meet the standards and rules stated in Chapter 2 of the text.

LEARNING ACTIVITIES:

1. Read Chapter 2 "Planning the Individual Rooms", pages 25-46 and do suggested activities at the end of the chapter.
2. Read pages 4-5 and work figure 11. Have your instructor check this over.
3. Sketch required problem in figure 12, on page 6 of your text.
4. Take Quiz 4-Q on space utilization.

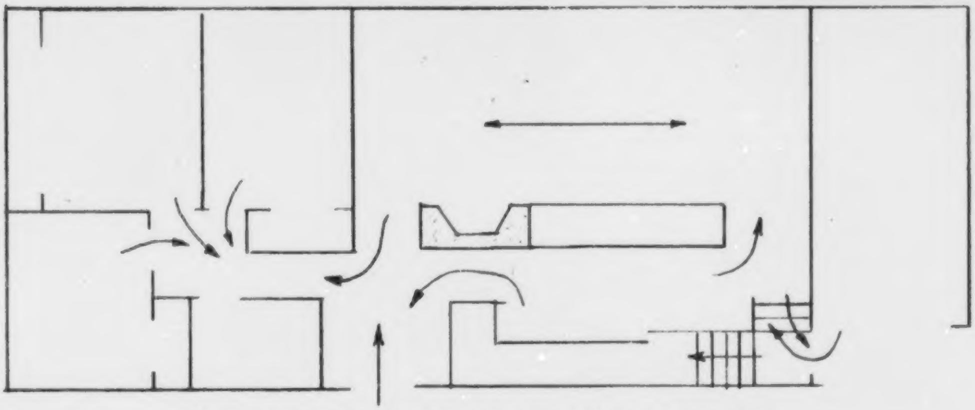
EVALUATION:

The student will draw and will design a floor plan using correct traffic patterns and show a wise use of space. Rules and standards of the text and "Architectural Graphic Standards" shall be used. Student must also pass an exam "Space Utilization". Performance must be to 90% accuracy.

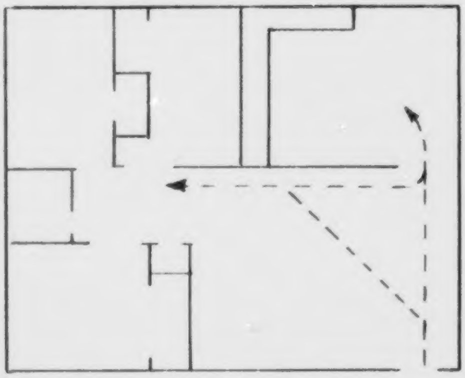
QUIZ 4-Q

Arch Unit E Comp 4 of 7

UNIT: E Interior Design



A PLAN WITH A GOOD TRAFFIC PATTERN



REVISION NEEDED

NOTE:

FOUR REVISIONS MUST
NOT INCREASE COST OF
HOUSE

STUDENT COMPETENCY SHEET

Arch Unit E Comp 5 of 7

SPECIALIZATION: Architecture

UNIT: E Room Plan

COMPETENCY STATEMENT: Plans the individual rooms for a house.

PERFORMANCE OBJECTIVE: The student will design the room layout of a house using the general considerations as listed on pages 27-45 in text "Architectural Drawing and Design". The student must also pass an exam on Room Layout.

LEARNING ACTIVITIES:

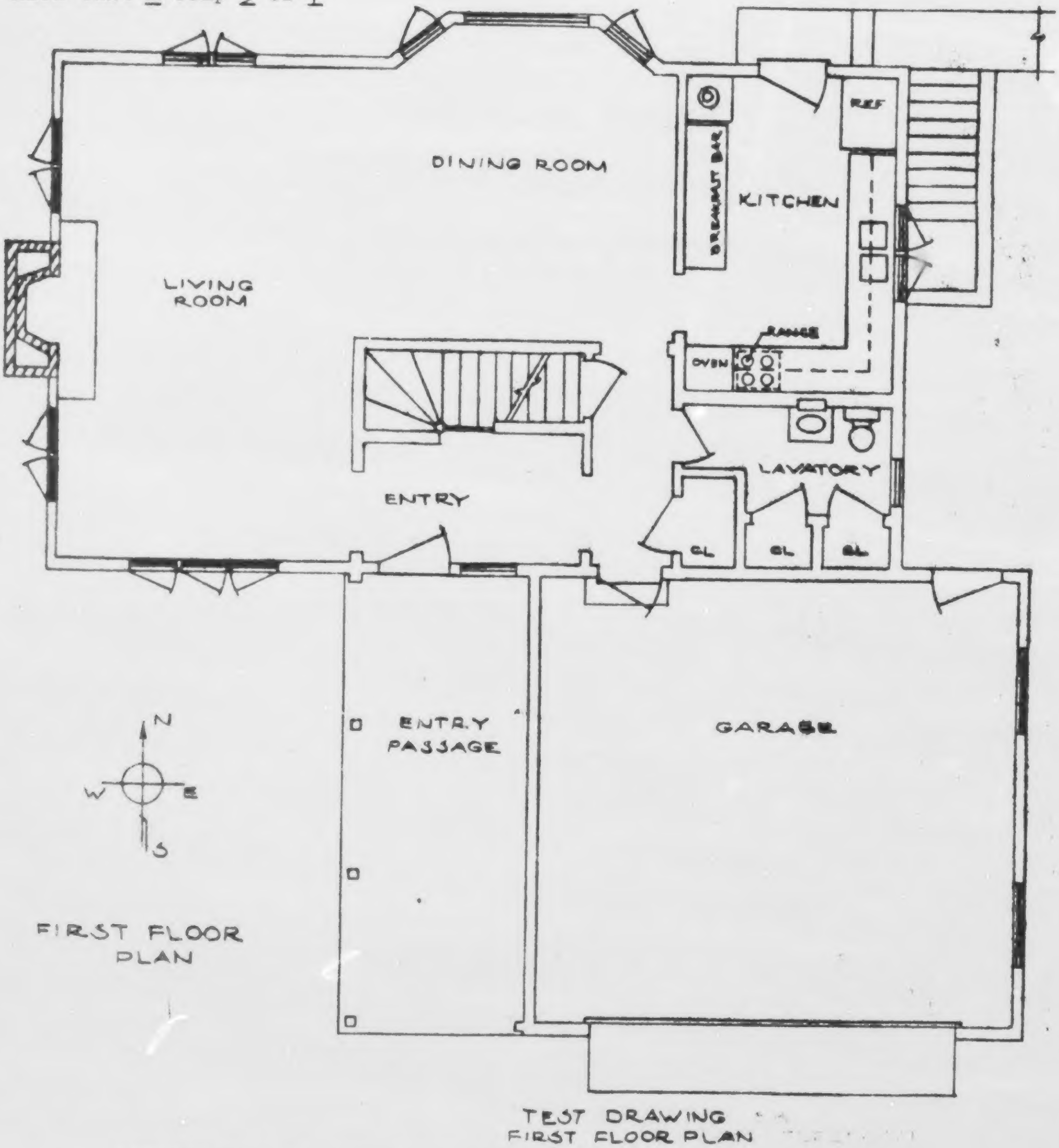
1. Read Chapter 2, pages 27-45 in your text "Architectural Drawing and Design". Sketch your floor plan and check against the list given in the text.
2. Research several magazines to find violations of good planning principles. Keep a notebook.
3. Visit some homes for sale (new). Make a list of violations you find.
4. Compute the cost of the following foyer 4'0" x 6'0", second bath, enlarging the two-car garage from 18'0" x 18'0" to 20'0" x 20'0".
5. Compute the cost of closet space for a 4 bedroom house with a full basement.

EVALUATION:

The student will design the room layout of a house using the general considerations as listed in your text. The student must also pass an exam on Room Layout.

HANDOUT SHEET #305

Arch Unit E Comp 5 of 7



TEST DRAWING
FIRST FLOOR PLAN

DIRECTIONS: Sketch floor plan using the proper techniques.

STUDENT COMPETENCY SHEET

Arch Unit E Comp 6 of 7

SPECIALIZATION: Architecture

UNIT: E Preliminary Floor Plan

COMPETENCY STATEMENT: Sketches preliminary floor plans.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to sketch a floor plan given to him by the instructor. The student may use any reference in the classroom. Sketch must meet standards of "Mechanical Drawing" text or approved methods of sketching set up by the instructor. Any reference on architecture may be used.

LEARNING ACTIVITIES:

1. You will observe blackboard demonstrations given by the instructor and be prepared to ask or answer questions.
2. Take the necessary information on Handout Sheet #305 and sketch preliminary floor plan.
3. Have your instructor go over your sketch with you.
4. If you have problems with the first sketch, have your instructor assign another.

EVALUATION:

The student will make a final sketch of a floor plan. The plan will check sketching techniques and basic knowledge of floor plan layout. Drawing must meet standards of good sketching "Mechanical Drawing" text and floor plan layout techniques in "Architecture" textbook.

STUDENT COMPETENCY SHEET

Arch Unit E Comp 7 of 7

SPECIALIZATION: Architecture

UNIT: E Stairs

COMPETENCY STATEMENT: Calculate stair layouts.

PERFORMANCE OBJECTIVE: Given the necessary equipment and references, the student will calculate stair layouts. All work must meet the standards of the "Architectural Graphic Standards". Student must pass exam with 90% accuracy.

LEARNING ACTIVITIES:

1. Attend demonstration - lecture given by instructor.
2. Read pages 7-10 in your text. Be prepared to discuss.
3. View several plans that your instructor may have. Discuss any questions.
4. Take Quiz 5-Q "Stair Layout".
5. If the house you are designing has stairs, begin calculations and discuss with your instructor.

EVALUATION:

You will calculate stair layout for your house and take exam "Stair Layout". You must score 90% on exam and all work will meet "Architectural Graphic Standards".

QUIZ 5-Q

Arch Unit E Comp 7 of 7

UNIT: E Stairs

STAIR LAYOUT

__Points each

1. Define:
   Total Rise
   Unit Rise
   Riser
   Total Run
   Tread
   Nosing
   Wellhole
   Headroom
   Stringer

2. What factors would you consider in the initial stair design?

3. What is the generally accepted rule on the height of a step?

4. How is the total rise of a stair determined?

5. How is the number of risers in a stair determined?

6. List the three commonly used stair-ratio formulas.

7. Find the number of risers, the unit rise, and the unit run for the following total rises.

   96 1/2"
   108"
   110 1/2"
   115"
   106 1/2"

8. Find the number of risers, the unit rise, and unit run when the total rise and run are known.

Total Rise	Total Run
112 1/2"	150"
108 3/4"	141"
116 1/4"	158"
101 1/2"	138"
119 3/4"	155"

9. What is the minimum headroom for a stairway?

10. How is the length of the stairwell determined?

QUIZ 5-Q (CON'T)

Arch Unit E Comp 7 of 7

11. Find the length of the stairwell in A and B below using the information.

	A	B
Total Rise	9'0"	8'2"
No. of Risers	14	13
Unit Rise	7.71"	7.54"
Unit Run	9.50"	9.75"
Headroom	7-6 1/2"	6'-4"
Upper Construction	9 3/4"	10 3/4"

12. Design stairways to meet the conditions in the following problems. The desired headroom in each case is 6'8".

Total Rise	Length of Stairwell
103 3/4"	9'10"
106"	10'3"
110"	9'8"
106"	10'2"

13. What types of stairs require landings?

14. How is the size of the stairwell determined for stairs having landings?

15. When are winding steps used?

16. What precautions must be taken when laying out winding stairs? Why?

STUDENT COMPETENCY SHEET

Arch Unit F Comp 1 of 2

SPECIALIZATION: Architecture

UNIT: F Dimensioning Floor Plan

COMPETENCY STATEMENT: Knows the rules of dimensioning floor plan drawings.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to pass an exam with 90% accuracy on the rules of dimensioning a floor plan. All work must meet the standards of your textbook and as listed in Handout No. 4 "Dimensioning Floor Plans".

LEARNING ACTIVITIES:

1. Attend lecture given by the instructor.
2. Read and discuss page 94, section "Dimensioning the Floor Plan" in your textbook.
3. Obtain a copy of Handout #306, "Dimensioning a Floor Plan".
4. Examine several workings in Chapter 4. Discuss any questions with your instructor.
5. Take quiz 6-Q "Dimensioning a Floor Plan".
6. Begin dimensioning final floor plan done from preliminary sketch.
7. If you have difficulty, consult activity #2.

EVALUATION:

The student will pass an exam with 90% accuracy on rules of dimensioning a floor plan without the use of references. All work will meet the standards as listed in Handout #306.

HANDOUT SHEET #306

Arch Unit F Comp 1 of 2

UNIT: F Dimensioning Floor Plan

DIMENSIONING A FLOOR PLAN

1. Dimension all walls and partitions.
2. In frame construction, the dimensions are given from the outside faces of the studs in exterior walls and to the center lines of interior partitions.
3. Cumulative dimensions should lie on one wall if possible.
4. Dimensions are placed on all sides of the plan.
5. All ells or projections are dimensioned.
6. Overall dimensions are placed on all sides of the drawing.
7. Notes are used to clarify things that cannot be clearly drawn.
8. Doors, windows, pilasters, beams, and areaways are dimensioned to thin center lines.
9. Since building materials vary somewhat in size, first extablish the thickness of each component of the wall and partition, such as thickness, panel thickness, plaster thickness, stud thickness, and brick thickness. Add these thicknesses together to establish the total wall thickness.
10. Architectural dimension lines are unbroken lines with dimensions placed above the line.
11. Foot and/or inch marks are used on all architectural dimensions.
12. Fractional dimensions are often slashed to conserve vertical space.
13. Overall building dimensions are placed outside the other dimensions.
14. The dimensions of brick or stone veneer must be added to the framing dimensions.
15. When the space is small, arrowheads may be placed outside the extension lines.

Arch Unit F Comp 1 of 2

16. A dot with a leader refers to the large area noted.

17. In dimensioning stairs, the number of risers is placed on a line with an arrow indicating the direction (up and down).

18. Use abbreviations when symbols do not show clearly what is intended.

QUIZ 6-Q

Arch Unit F Comp 1 of 2

UNIT: F Dimensioning Floor Plan

DIMENSIONING A FLOOR PLAN

__Points each

True - False

____ 1. Only one exterior wall and one partition need to be dimensioned.

____ 2. In frame construction, the dimensions are given from the outside faces of the studs in exterior walls and to the center lines of interior partitions.

____ 3. Cummulative dimensions should lie on one wall if possible.

____ 4. Dimensions are placed on one side only.

____ 5. All ells or projections are dimensioned.

____ 6. Overall dimensions are placed on two sides of drawing.

____ 7. More details are used to clarify things that cannot be clearly drawn.

____ 8. Doors and windows are dimensioned to thin center lines.

____ 9. You may use standards for determining wall thicknesses.

____10. Architectural dimension lines are broken lines with dimensions placed between the lines.

____11. Foot and/or inch marks do not need be placed on dimensions in architecture.

____12. The dimensions of brick or stone veneer must be added to the framing dimensions.

____13. A dot with a leader refers to the large area noted.

____14. In dimensioning stairs, the number of risers is all that is needed.

QUIZ 6-Q (CON'T)

Arch Unit F Comp 1 of 2

____15. You may use abbreviations when symbols do not show clearly what is intended.

____16. It is common to put door and window sizes directly on the floor plan.

STUDENT COMPETENCY SHEET

Arch Unit F Comp 2 of 2

SPECIALIZATION: Architecture

UNIT: F Floor Plans

COMPETENCY STATEMENT: Demonstrates knowledge of nature and content of floor plans and the symbols used to represent the content.

PERFORMANCE OBJECTIVE: Given the necessary equipment student will be able to demonstrate a knowledge of nature and content of floor plans by passing with 90% accuracy an exam. No reference can be used. All work must agree with standards and techniques used in the textbook.

LEARNING ACTIVITIES:

1. Read Chapter 4 in your text, pages 90-105 and answer the questions at the end of the chapter.
2. Attend lecture given by the instructor.
3. Attend class discussion of the questions at the end of the Chapter 4.
4. Take Quiz "Floor Plan Drawings".
5. If score is less than 90% accurate, go back and review.
6. Take previous preliminary floor sketch and begin final floor plan drawing.

STUDENT COMPETENCY SHEET (CON'T)

Arch Unit F Comp 2 of 2

EVALUATION:

The student will pass exam "Floor Plan Drawing" with 90% accuracy demonstrating a knowledge of nature and content of floor plans. You cannot use any references and work must conform to "Architectural Graphic Standards".

QUIZ 7-Q

Arch Unit F Comp 2 of 2

UNIT: F Floor Plans

FLOOR PLAN DRAWING

____Points each

1. What are the two commonly used scales of floor plan?
2. Why is the floor plan cinsidered the most important drawing?
3. What should be done before beginning the final floor plan drawing?
4. Is a floor plan considered a sectional view?
5. Using 1/4" = 1'o" scale, what is the thickness of a frame, frame with brick veneer, and thickness of concrete block?
6. Why should window selection be made before the floor plan is drawn?
7. The width of the windows given on the plan is that of the ________________opening.
8. How much should be allowed for a rough opening for exterior doors?
9. What detail drawings most always are needed?
10. How should different bedrooms be noted?
11. Why must door swings be shown?

NAME THE SIX BASIC STEPS IN FLOOR PLAN LAYOUT:

12.

13.

14.

15.

QUIZ 7-Q (CON'T)

Arch Unit F Comp 2 of 2

16.

17.

STUDENT COMPETENCY SHEET

Arch Unit G Comp 1 of 2

SPECIALIZATION: Architecture

UNIT: G Footers and Foundations

COMPETENCY STATEMENT: Knowledge of design for footer and foundation.

PERFORMANCE OBJECTIVE: Given the necessary equpment, the student will be able to design and draw footer and foundations using any reference. All designs must meet the specifications and standards contained in "Architectural Graphic Standards". Student must pass Quiz #8-Q "Footer and Foundation" with 90% accuracy.

LEARNING ACTIVITIES:

1. Define footer - foundation as defined in your text.
2. Read Chapter 6, "Footing, Foundation, and Basement Construction", in your text, pages 138-155 and do "Class Activities" list at the end.
3. Take Quiz 8-Q, "Footer and Foundation".
4. Draw footer-foundation for final floor plan drawing of chosen house.

EVALUATION:

The student will design and draw footer-foundation for final floor plan drawing of chosen house. All drawings and designs must meet the specifications and standards contained in the "Architectural Graphic Standards". Student will pass Quiz 8-Q, "Footer and Foundation" with 90% accuracy. No references may be used.

QUIZ 8-Q

Arch Unit G Comp 1 of 2

UNIT: G Footers and Foundations

FOOTER AND FOUNDATION

____Points each

1. What factor determines footer depth?
2. What four factors determine footer width?
3. Should the concrete be poured continuously?
4. How many days should concrete cure before a load is place on the footer?
5. Can you earth trenches instead of side form?
6. What minimum thickness for residential footers.
7. What is a good "rule of thumb" to use on footer thickness?
8. What is dead load?
9. What is live load?
10. In terms of a footer, what is the key?
11. What is a pilaster?
12. What procedure should be used if the footer is dug to deep?
13. Give the basic technique for waterproofing foundation walls.
14. Using Table 5, page 190 of your textbook, calculate the footing requirements for a one story, frame house built by conventional methods and standard materials. The bearing soil is hard clay. Roofing material is asphalt shingles. Foundation section is 7'6" high and 8" thick. The rafter length is 18'0". The exterior wall is 9'0". Footer is 1'4" wide.
15. Give the footer and foundation calculation for the house you are designing. All work must be shown.

STUDENT COMPETENCY SHEET

Arch Unit G Comp 2 of 2

SPECIALIZATION: Architecture

UNIT: G Calculations

COMPETENCY STATEMENT: Calculates loads and strengths of materials.

PERFORMANCE OBJECTIVE: Given the necessary materials and references, student will be able to calculate loads and strengths of materials. All work must conform to the tables in the "Architectural Graphic Standards".

LEARNING ACTIVITIES:

1. Student to attend lecture given by the instructor.
2. Read Chapter 7, "Loads and Strengths of Materials" in your textbook. Be prepared to ask or answer questions.
3. Define words at the end of the chapter.
4. Determine girder, beams, lintels, etc. for the house you are working on. Discuss these with your instructor.
5. Obtain a copy of the Quiz 9-Q, "Strength of Materials".

EVALUATION:

The student will calculate the loads and strengths of materials for the house he is designing. The student will pass with 90% accuracy a quiz. All work must meet the "Architectural Graphic Standards".

QUIZ 9-Q

Arch Unit G Comp 2 of 2

UNIT: G Calculations

LOADS - STRENGTHS OF MATERIAL

____Points each

1. What is the maximum span for a Southern pine floor joist with a 40-pound live load, spaced 16 inches on center, if the joist is 2 x 8; 2 x 10; 2 x 12?
2. What is the maximum span for a Southern pine ceiling joist with a 20-pound attic load, spaced 16 inches on center, if the joist is 2 x 6; 2 x 8; 2 x 10?
3. What is the required size of a joist for a Southern pine, low-slope roof, supporting a finished ceiling, if the joists are spaced 24 inches on center and must span 18' -6"?
4. A roof rafter must span 19'-5". What size joist must be used to span this distance, if it is made of Southern pine, supports a heavy roofing, and is spaced 16 inches on center? If the rafter supports light roofing?
5. A roof has a total rise of 6'-0" and a total span of 24'-0". What are the pitch and slope of the roof?
6. If floor joists are spaced 16 inches on center, what thickness of solid wood sheathing should be used? What thickness of plywood sheathing should be used?
7. A roof having a span of 24 inches between rafters is to be decked with a fiberboard material. What is the minimum thickness that can be used?
8. A roof is to be decked with 2-inch Douglas fir, using a simple span decking plan. What is the maximum spacing for the rafters in this roof, if the live load is 40 pounds per square foot?
9. A round concrete-filled steel column must support 35,000 pounds with an unbraced column length of 8'-0". What size steel base is on this column? What size wood column would be necessary to support this load?
10. A post-and-beam house is to have the roof decked with stressed-skin panels. The panels must span 14'-0". What is the total thickness of the panel? What size solid stock framing material is required? How many pieces of framing are needed in a panel 4'-0" wide?

QUIZ 9-Q (CON'T)

Arch Unit G Comp 2 of 2

11. Compute the girder load area for your house, and ascertain load on the girder. Select the girder that would safely carry this load. Measure the girder installed in your house and see if it is the proper size.

12. A post-and-beam house is to have the roof framed with a glued, laminated, peaked beam. If this beam is spaced 10 feet on center, must span 24'-0", and must support a total load of 40 pounds per square foot, what are the dimensions of the stock beam?

13. What size box beam is required if it is to serve as a floor beam and span 17'-0"?

14. What size open-web steel joist should be used to span 20'-0" and carry 40 pounds per square foot, if the joists are to be spaced 4'-0" on center? How many stock joists will economically carry this load?

15. A window in a brick house is 3'-6" wide. The lintel supports the brick, but no floor load. What is the total load on the lintel? What size concrete lintel would be required? What size steel lintel would be required?

STUDENT COMPETENCY SHEET

Arch Unit H Comp 1 of 4

SPECIALIZATION: Architecture

UNIT: H Wall Sections

COMPETENCY STATEMENT: Knowledge of members of detailed wall sections.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to pass an exam with 90% accuracy on wall sections of a frame, masonary, and veneered house. No references may be used. Drawings must conform to standards contained in "Architectural Graphic Standards".

LEARNING ACTIVITIES:

1. Read Chapter 5 "Methods of House Construction" in your text, pages 115-136. Make preliminary sketches for three types of wall sections.
2. Observe blackboard demonstration on wall sections. Be prepared to answer questions in discussion to follow.
3. Make preliminary sketch of wall section for your chosen or assigned house.
4. If you have difficulty with No. 3, review Chapter 5 and consult your instructor on problems encountered.
5. Take Quiz 10-Q, "Wall Sections".
6. Have your instructor check your preliminary sketch before beginning final drawing of detailed section.

STUDENT COMPETENCY SHEET (CON'T)

Arch Unit H Comp 1 of 4

EVALUATION:

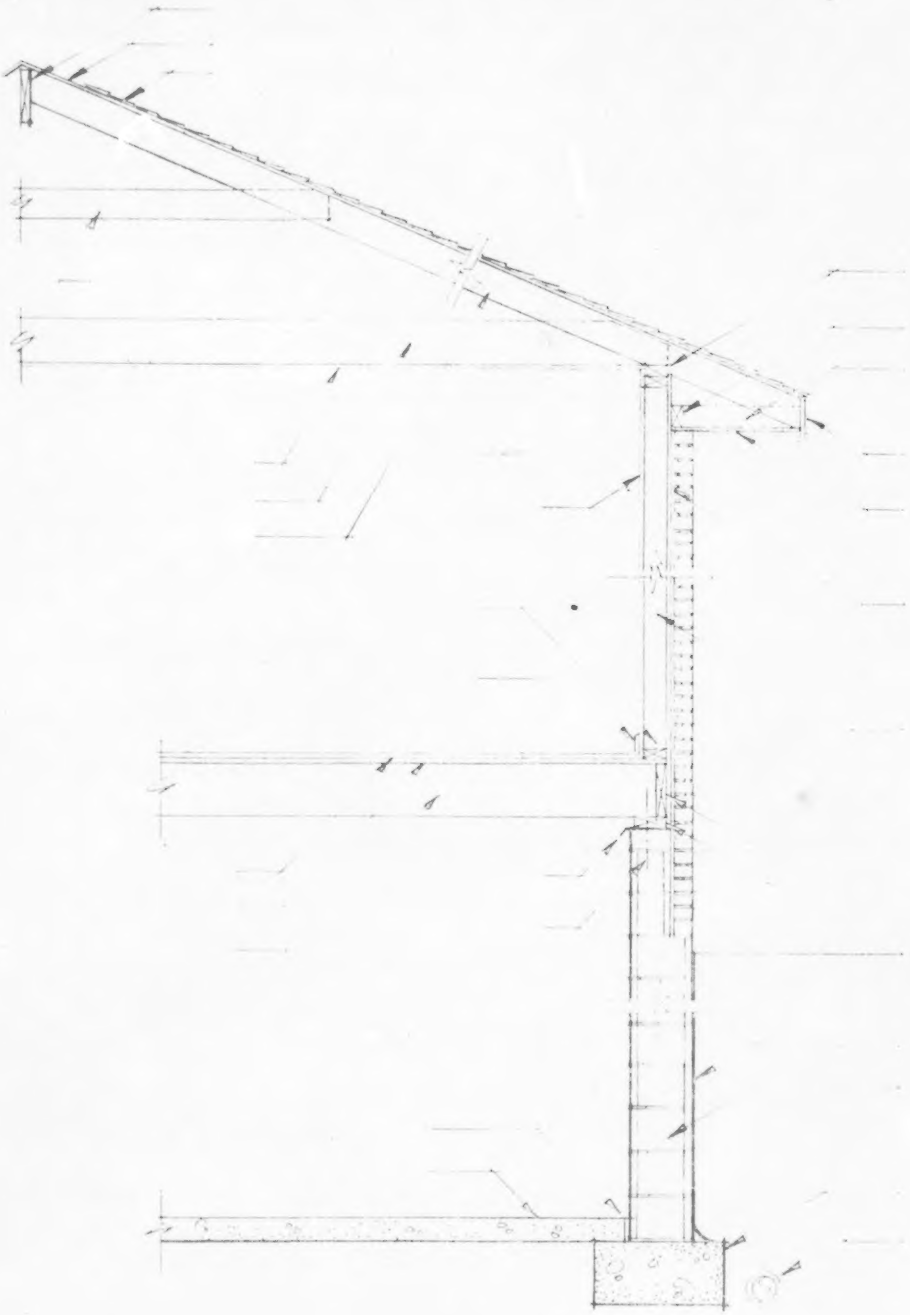
The student will pass an quiz on wall sections with 90% accuracy in order to show his knowledge of wall components by meeting standards contained in "Architectural Graphic Standards".

QUIZ 10-Q

Arch Unit H Comp 1 of 4

UNIT: H Wall Sections

____Points each



STUDENT COMPETENCY SHEET

Arch Unit H Comp 2 of 4

SPECIALIZATION: Architecture

UNIT: H Dimensioning

COMPETENCY STATEMENT: Dimensions wall sections.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to dimension wall sections. Student must use rules and standards stated in Handout Sheet 307.

LEARNING ACTIVITIES:

1. Attend lecture given by instructor.
2. Read pages 131-134 and make a sketch of typical wall section found on page 132 of textbook.
3. Take short quiz "Wall Sections".
4. If score was less than 90% on your quiz, review activity 1.

EVALUATION:

Student will pass a written exam on dimensioning a wall section. Exam score must be 90% accurate. Student will also dimension final wall section using standards in Handout Sheet #307.

HANDOUT SHEET #307

Arch Unit H Comp 2 of 4

UNIT: H Dimensioning

WALL SECTIONS

1. Label all structural parts.
2. Use symbols to differentiate parts.
3. To reduce overall height, break section.
4. Locate heads of windows and doors with a dimension from the finished floor.
5. Dimension footing and foundation and show depth below grade.
6. Dimension the overhang at eave.
7. Show roof pitch.

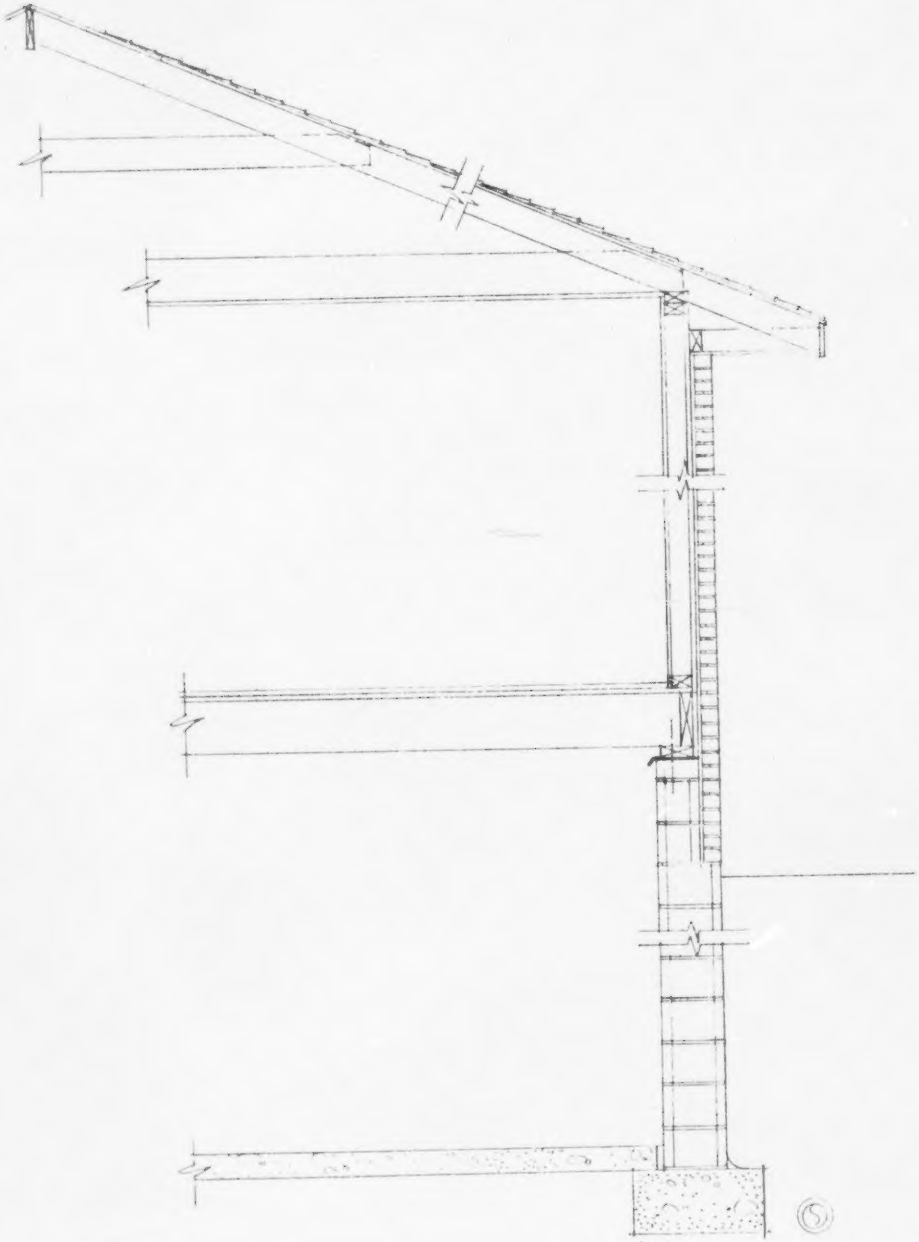
QUIZ 11-Q

Arch Unit H Comp 2 of 4

UNIT: H Dimensioning

____Points each

DIRECTIONS: Dimension wall section fully.



STUDENT COMPETENCY SHEET

Arch Unit H Comp 3 of 4

SPECIALIZATION: Architecture

UNIT: H Sill

COMPETENCY STATEMENT: Draws to scale a section view of a sill.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to draw a sectional view of a sill. Any reference may be used, but drawings must conform to "Architectural Graphic Standards".

LEARNING ACTIVITIES:

1. Read pages 117-118, section labeled "sills" in your text book. Make sketches.
2. List the advantages of "Platform Framing" compared to "Balloon Framing".
3. Make a preliminary sketch of type sill you intend to use in your house plan.
4. If your understanding is not clear, consult your instructor for further information.

EVALUATION:

The student will draw a detailed sill (preferably box sill) to be used in the construction of said designed house. Drawing must meet "Architectural Graphic Standards".

STUDENT COMPETENCY SHEET

Arch Unit H Comp 4 of 4

SPECIALIZATION: Architecture

UNIT: H Insulating

COMPETENCY STATEMENT: Uses principles and rules of insulating.

PERFORMANCE OBJECTIVE: Given the necessary equipment and references, the student will be able to use principles and rules of insulating to properly determine insulation needs of a residence. Student will also pass an exam to 90% accuracy. All work must meet standards set forth in "Architectural Graphic Standards".

LEARNING ACTIVITIES:

1. Read pages 309-314 in Chapter 10 of your textbook. Be prepared to discuss.
2. Attend lecture given by the instructor.
3. Compute the heat loss for one room in your home. Explain what could be done to reduce this loss.
4. Take Quiz 12-Q, "Insulating".
5. Compute insulation needs for the house you are designing.

EVALUATION:

The student will use principles and rules of insulating to pass, with 90% accuracy, an Quiz 12-Q "Insulating", also determine insulating need for a residence. All work must meet standards of good insulating contained in "Architectural Graphic Standards". No references can be used on the exam.

QUIZ 12-Q

Arch Unit H Comp 4 of 4

UNIT: H Insulating

INSULATING

____Points each

1. What is the major purpose of thermal insulation?
2. How does insulation work in retarding heat loss?
3. What does "dead air space" refer to?
4. Name 3 ways in which "structural insulation board" may be used.
5. What is "blanket insulation"?
6. What is the difference between "batt and blanket insulation"?
7. What would be a good way to insulate an already existing frame house?
8. Explain perlite and vermiculite insulation.
9. Explain the process of making insulating concrete.
10. Where could polystyrene plastic slabs be used as insulation material?
11. What are the general standards for electric heat?
12. Should a residence with a basement have floor insulation? Explain your answer.
13. What is the purpose of a vapor barrier?
14. Using the information on the blackboard, compute the insulation needs of these residences.

STUDENT COMPETENCY SHEET

Arch Unit I Comp 1 of 6

SPECIALIZATION: Architecture

UNIT: I Design

COMPETENCY STATEMENT: Identifies the four basic residential home designs and lists the advantages and disadvantages of each.

PERFORMANCE OBJECTIVE: On a written test you will identify the four basic residential home designs and list the advantages and disadvantages of each. Designs are listed on pages 10-12 in "Architectural Drawing and Design". No references may be used.

LEARNING ACTIVITIES:

1. Read pages 10-12 in your text and sketch 4 designs.
2. Make a list of considerations for land lay for each design.
3. Make a sketch of the design you chose and explain why you chose it.

EVALUATION:

On a written test you will identify the four basic residential home designs and list the advantages and disadvantages of each. No references may be used.

STUDENT COMPETENCY SHEET

Arch Unit I Comp 2 of 6

SPECIALIZATION: Architecture

UNIT: I Styles

PERFORMANCE OBJECTIVE: Given a series of slides, you will identify different house styles and the characteristics of each. No references may be used. House styles are those covered in "Architectural Drawing and Design".

LEARNING ACTIVITIES:

1. Read Chapter 3 "Designing the Exterior" and make a list of styles representing to the general area.
2. Make a list of possible "pit falls" in mixing house styles.
3. Sketch the floor plan of a house from a magazine devoted to different exteriors for this plan.
4. Submit these sketches to your instructor, be sure to apply design, composition, proportion, scale, contrast, rhythm, and unity.

EVALUATION:

Given a series of slides, you will identify different house styles and the characteristics of each. No references may be used.

STUDENT COMPETENCY SHEET

Arch Unit I Comp 3 of 6

SPECIALIZATION: Architecture

UNIT: I Roofs

COMPETENCY STATEMENT: Identifies common roof designs and symbols related to each.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to identify common roof designs and symbols related to each. No references may be used and all work must meet standards of textbook.

LEARNING ACTIVITIES:

1. Read pages 63-64, "Roof Types". Sketch the roof types.
2. Study Handout Sheet #308 ask questions of roof types you do not understand.
3. Go to your instructor and get a copy of the Quiz 13-Q "Roof Types".
4. If your score is less than 90%, go back and review.

EVALUATION:

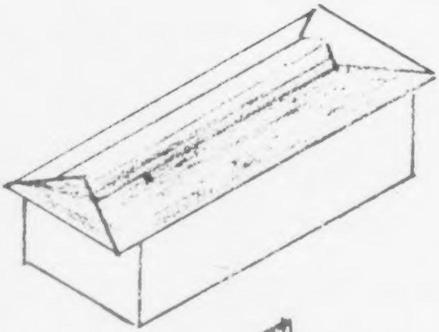
The student will take an exam on "Roof Types". The student must identify common roof designs with 90% accuracy and conform to textbook standards.

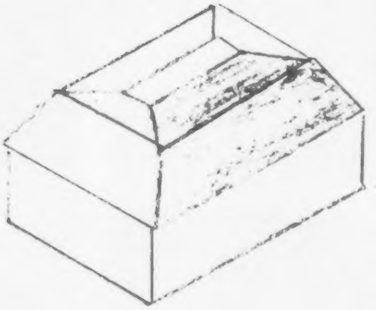
HANDOUT SHEET #308

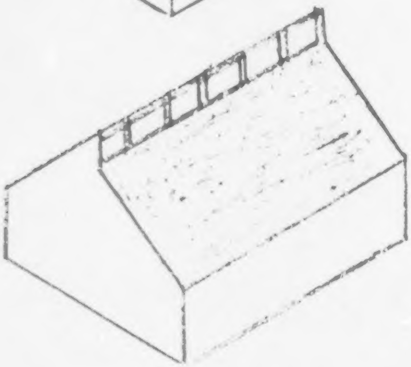
Arch Unit I Comp 3 of 6

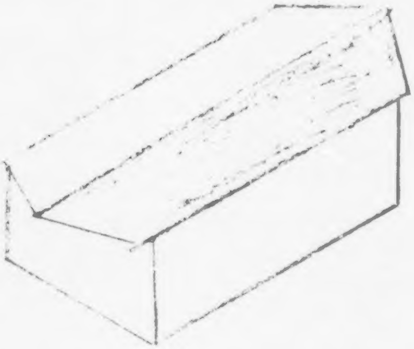
UNIT: I Roofs

Identify Roof Types







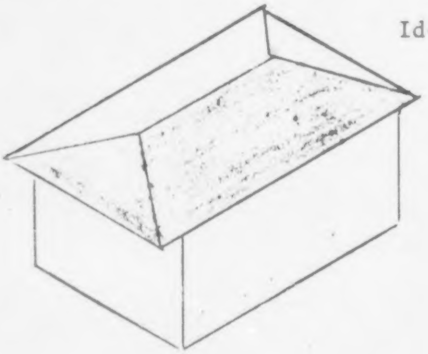


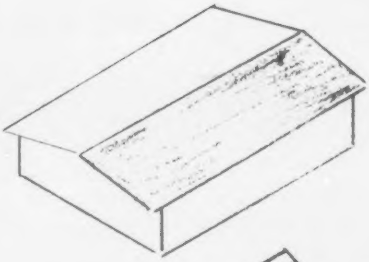
HANDOUT SHEET #308 (con't)

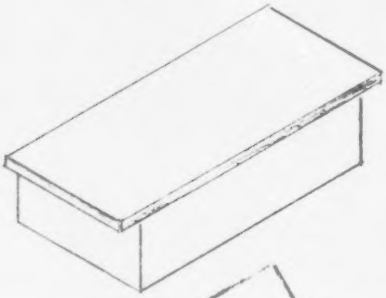
Arch Unit I Comp 3 of 6

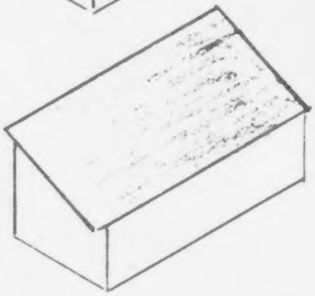
UNIT: I Roofs

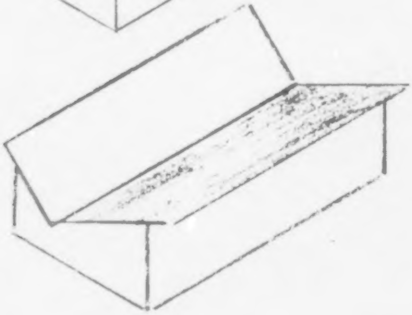
Identify Roof Types

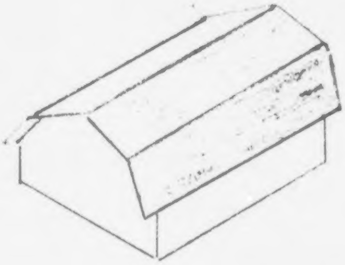












QUIZ 13-Q

Arch Unit I Comp 3 of 6

UNIT: I Roofs

ROOF TYPES

____Points each

1. Compare the gable and hip roof by listing the advantages of both?
2. Explain "slope" in roof design.
3. Explain "pitch" in roof design.
4. What is a "trussed" roof?
5. What are the names of the three roofs generally used for houses?
6. What roof is a modified hip roof with two slopes?
7. What roof is a modified gable roof with two slopes?
8. Would you use a shed roof on a cape cod architectural style?
9. Contemporary houses uses a number of roof styles, often in combination.
10. What is the most economical roof to build?
11. A roof style or types should contain what two qualities?

STUDENT COMPETENCY SHEET

Arch Unit I Comp 4 of 6

SPECIALIZATION: Architecture

UNIT: I Elevations

COMPETENCY STATEMENT: Knowledge to scale elevations of a residence.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will demonstrate a knowledge to scale elevations of a residence by quiz and drawing. No reference may be used in taking the exam and a score of 90% must be achieved. All drawing must meet standards in your textbook.

LEARNING ACTIVITIES:

1. Attend lecture given by the instructor.
2. Read pages 113 and 114 and be prepared for a class discussion.
3. Obtain a copy of Quiz 14-Q "Elevations" from your instructor.
4. If your score is less than 90% accurate, go back and review activities 1 and 2.
5. Begin your elevation drawings.

EVALUATION:

Student will take Quiz 14-Q "Elevations". The score must be 90% accurate. Elevation drawings must meet rules stated in textbook.

QUIZ 14-Q

Arch Unit I Comp 4 of 6

UNIT: I Elevations

ELEVATIONS

____Points each

1. What is an elevation?
2. How many elevations are required for the exterior of the average house?
3. Why are elevations so important?
4. What must the designer keep in mind when designing the elevation of a house?
5. May more than one specific elevation be made for the same floor plan?

Briefly list the suggested procedures for drawing elevations.

6.
7.
8.
9.
10.
11.
12.
13.
14.
15.
16.

STUDENT COMPETENCY SHEET

Arch Unit I Comp 5 of 6

SPECIALIZATION: Architecture

UNIT: I Elevations

COMPETENCY STATEMENT: Dimensions Elevations

PERFORMANCE OBJECTIVE: Given the necessary equipment, you will dimension four elevations. No references may be used and drawings must meet standards of Handout Sheet 309.

LEARNING ACTIVITIES:

1. Attend lecture given by the instructor.
2. Obtain a copy of Handout Sheet 309 and read. Be prepared to answer questions.
3. Observe several elevations - noting the dimensioning techniques used.
4. Dimension four (4) previous drawn elevations.

EVALUATION:

The student will dimension the 4 elevations previously drawn. All dimensioned elevations must meet the standards/rules in Handout Sheet 309.

HANDOUT SHEET #309

Arch Unit I Comp 5 of 6

UNIT: I Elevations

DIMENSIONING AN ELEVATION VIEW

1. The ceiling line and floor line are located. The total distance between these are shown.
2. Roof slope is shown by a symbol.
3. Exterior siding materials are noted as brick, asphalt shingles, or board batten siding.
4. The overhang of the roof at the eaves is dimensioned.
5. The finished grade is indicated with a note.
6. Heights of windows are dimensioned from the floor line to the top of the windows or doors.
7. Elevation dimensions show only vertical distances. Horizontal distances are shown on the floor plan.
8. Windows and doors may be indexed to a door and window schedule. The style of the doors and windows may be shown on an elevation drawing.
9. Dimensions for small, complex or obscure areas should be indexed to a separate detail.
10. Ground line elevations are expressed as heights above the datum.
11. Heights of chimneys above the ridge line are dimensioned. Chimneys should extend 2'-0" above a nearby ridge line.
12. Heights of planters and walls are dimensioned from the ground line.
13. Thicknesses of slabs are dimensioned.
14. Overall height dimensions are placed on the outside of sub-dimensions.
15. Thicknesses of footers are dimensioned.
16. Show the depth of the footing below grade.

Arch Unit I Comp 5 of 6

17. Finished floor to finished floor heights are usually dimensioned.

18. Vertical elevation dimensions should be read from the right of the drawing.

19. Levels to be dimensioned should be labeled with a note, term, or abbreviation.

20. The depth of footings is dimensioned from the ground line.

STUDENT COMPETENCY SHEET

Arch Unit I Comp 6 of 6

SPECIALIZATION: Architecture

UNIT: I Schedules

COMPETENCY STATEMENT: Prepare door and window schedules.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will prepare door and window schedules using any reference available. Schedules must conform to instructor's standards.

LEARNING ACTIVITIES:

1. Practice title block on page 111.
2. Review several door and window schedules that your instructor may have.
3. Make a rough draft of your door and window schedule for your instructor's approval use Handout Sheet #310 as a guide.
4. Make final door and window schedules for the house you are drawing.

EVALUATION:

The student will prepare a door and window schedule for his house plan. All schedules are to meet standards set forth by the instructor.

Arch Unit I Comp 6 of 6
UNIT: I Schedules

HANDOUT SHEET #310

DOOR SCHEDULE

MK	NO.	SIZE	DESCRIPTION	REMARKS
1	[illegible]	[illegible]	14 PANEL WP, [illegible]	
2	1	2'-8"×6'-8"× [illegible]	FLUSH WP, ILT	
3	2	2'-8"×6'-8"×1¾	2 PANEL WP, 3LT	
4	10	2'-6"×6'-8"×1¾	FLUSH BIRCH	
5				
6				

CLASS STANDARD

272

286

STUDENT COMPETENCY SHEET

Arch Unit J Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: J Plumbing

COMPETENCY STATEMENT: Knowledge of plumbing layout of a residence.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student will be able to draw a plumbing layout. Also to pass an quiz with 90% accuracy. All work must meet "A.G.S." standards.

LEARNING ACTIVITIES:

1. Read Chapter 9, page 255. Answer questions at the end of the chapter.
2. Sketch simple water-piping diagram, Fig. 609, page 266 of your text.
3. Consult your instructor and obtain a copy of the Quiz 15-Q "Plumbing".

EVALUATION:

Student will do a plumbing layout using no references. You must make a score of 90%. All work must meet "A.G.S." standards.

QUIZ 15-Q

Arch Unit J Comp 1 of 1

UNIT: J Plumbing

____Points each

1. What is the function of a trap?

2. What is the function of a vent?

3. What size trap is used on a kitchen sink?

4. What size trap is used on a bathroom vanity?

5. What two materials are most frequently used for water lines?

   a.

   b.

6. Why should water pipes or sewers be placed inside a pipe collar when they pass through a foundation wall?

7. What is another name for outside water faucets?

8. What is the recommended amount of slope for a sewer?

9. What is the recommended spacing between parallel hot and cold water pipes?

STUDENT COMPETENCY SHEET

Arch Unit K Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: K Electrical

COMPETENCY STATEMENT: Knowledge of electrical layout of residence.

PERFORMANCE OBJECTIVE: Given the necessary equipment the student will be able to do an electrical layout of a residence. The student must pass a quiz with 90% accuracy. All work must meet the standards contained in the "A.G.S." and "National Electrical Code".

LEARNING ACTIVITIES:

1. Read chapter of your text. Page 237, do questions at the end of the chapter.
2. On your previous preliminary sketch of the floor plan, plan the electrical layout using any reference.
3. Take Quiz 16-Q "Electrical Layouts".

EVALUATION:

The student will take a quiz on "Electrical Layout". A score of 90% accuracy is required. No references may be used. All work shall meet the "A.G.S." and "National Electrical Code".

QUIZ 16-Q

Arch Unit K Comp 1 of 1

UNIT: K Electrical

DIRECTIONS: Show all electric symbols required.

1. Single pole switch
2. 3-way switch
3. Duplex outlet
4. Split wired receptacle outlet
5. Weatherproof duplex outlet
6. Range outlet
7. 220 Volt outlet
8. Junction box
9. Lighting outlet
10. Rectangle recessed light
11. Fluorescent light
12. pull switch
13. Fan
14. Clock outlet
15. Bell
16. Push button
17. Exit light
18. Regular telephone
19. Interphone
20. T.V.
21. Master panel box
22. Buzzer
23. Chime

STUDENT COMPETENCY SHEET

Arch Unit L Comp 1 of 1

SPECIALIZATION: Architecture

UNIT: L Fireplace Design

COMPETENCY STATEMENT: Understands principles of good fireplace design.

PERFORMANCE OBJECTIVE: Given the necessary equipment, materials, and references, the student will be able to understand principles of good fireplace design. The student will take a quiz. All work must conform to standards of the "A.G.S."

LEARNING ACTIVITIES:

1. Read pages 298-309 in your textbook and be prepared to discuss.
2. Sketch "roughing" details of fireplace that will fit your present house.
3. Compare your design with some your instructor may have. Discuss differences.
4. Ask instructor for Quiz 17-Q.

EVALUATION:

The student will demonstrate a knowledge of basic fireplace design by designing a fireplace and a quiz requiring 90% accuracy. All work must meet "A.G.S." standards

QUIZ 17-Q

Arch Unit L Comp 1 of 1

UNIT: L Fireplace Design

FIREPLACE DESIGN

____Points each

1. Give several advantages of the Conventional Fireplace over the Metal Unit.
2. What is the minimum thickness of a firebox?
3. How far sould the hearth extend in front of the fireplace opening?
4. How far should the hearth extend on each side of the fireplace opening?
5. What is the recommended distance combustible material can be placed to the fireplace opening?
6. What is the Ash Dump?
7. What is the generally accepted method of constructing the Conventional Fireplace?
8. How should the hearth, including that portion outside the fire area, be supported?
9. What size reinforcing bars should be placed in concrete slab?
10. What kind of flue lining should be used in the chimney?
11. How thick should the chimney wall be?
12. How much air space is needed from the framing members?
13. What is the distance the chimney should extend above the roof? Why?
14. May other flues, such as furnaces, be vented into the chimney?
15. What thickness of Masonary is needed around Flue Lining, if no lining is used?

STUDENT COMPETENCY SHEET

Arch Unit M Comp 1 of 2

SPECIALIZATION: Architecture

UNIT: M House Perspective

COMPETENCY STATEMENT: Knowledge of house in perspective.

PERFORMANCE OBJECTIVE: Given the necessary equipment, the student shall exhibit a basic knowledge of perspective drawing by passing a quiz with 90% accuracy, using no references. All work shall conform to standards of perspective drawing as stated in "Technical Illustration" by T. A. Thomas.

LEARNING ACTIVITIES:

1. Attend lecture and demonstration given by instructor.
2. Read Chapter 12 of your text.
3. Choose several square and rectangle shapes and draw them with one two-point perspective.
4. Using two-point perspective draw the house you have designed. Do not landscape.
5. Take written Quiz 18-Q.

EVALUATION:

The student will show a knowledge of basic perspective drawing by passing a quiz with 90% accuracy. No reference can be used. All work shall conform to standards listed in text "Technical Illustration".

QUIZ 18-Q

Arch Unit M Comp 1 of 2

UNIT: M House Perspective

PERSPECTIVE DRAWING

____Points each

1. Define perspective drawing as defined in the text "Technical Illustration".
2. How is perspective drawings different from other objects?
3. Explain "vanishing point".
4. What are two aids that may be used to measure perspective drawings?
5. Do industrial illustrators and architects use mechanical aids to do perspective drawing?
6. Explain the term "picture plane".
7. Explain the term "horizon line".
8. How are "vanishing points" established?
9. Name the three types of perspective drawings and explain.
10. Which of the two basic methods of perspective drawings are used in Architectural drawings?
11. Explain the term "bird's eye view and worm's eye view".
12. Where would you place a house in perspective if the eaves were to be shown?
13. Discuss the methods of putting the landscape in perspective.

STUDENT COMPETENCY SHEET

Arch Unit M Comp 2 of 2

SPECIALIZATION: Architecture

UNIT: M Rendering

COMPETENCY STATEMENT: Knowledge of rendering techniques used to express final concepts.

PERFORMANCE OBJECTIVE: Given the necessary equipment, and using no references, the student will be able to pass a quiz with 90% accuracy. All work will be based on standards of rendering techniques as listed in "Technical Illustration" by T. A. Thomas.

LEARNING ACTIVITIES:

1. Read pages 338-348 in your text. Be prepared for discussion.
2. Attend lecture - demonstration given by the instructor.
3. Draw several rectangles, etc. and use different methods of shading for effect.
4. Draw several trees and shrubbery.
5. Take Quiz 19-Q "Rendering Technique".
6. Try an architectural rendering of your house in its natural setting.

EVALUATION:

The student will show a knowledge of rendering techniques by passing a quiz with 90% accuracy. No reference may be used.

QUIZ 19-Q

Arch Unit M Comp 2 of 2

UNIT: M Rendering

RENDERING TECHNIQUES

____Points each

1. Why do architects do rendering?
2. Is color vital to a rendering?
3. Does all surfaces have texture?
4. What is meant by the word "value" in rendering?
5. What is the usual degree that the sum is assumed in when rendering?
6. Should a rendering have mechanical appearance?
7. Placement of objects on the sheet involves what three considerations? Explain.
8. Explain matting.
9. What does "birdeye view" mean?
10. Name 4 mediums that may be used in rendering.
11. What does the term "smudging" mean in rendering?
12. What is an illustration board?
13. What background colors could be used to compliment red brick?
14. If drawing a store front, where could line shading be used to show depth?
15. Should the rendering of a tree show great detail of branches and leaves?
16. For general black and white rendering, what type of pencil point is suggested?

Arch Unit M Comp 2 of 2

17. What are "Burnish - Ons"?

18. Do architects do much of their own rendering for presentations?

PART IV

PIPING

STUDENT COMPETENCY SHEET

PD Unit A Comp 1 of 1

SPECIALIZATION: Piping

UNIT: A Equipment and Terms

COMPETENCY STATEMENT: Identifies and defines equipment and terms.

PERFORMANCE OBJECTIVE: Given the necessary tools and a list of terms and equipment, you will be able to define this list.

LEARNING ACTIVITIES:

1. Read pages 1-8 "Process Piping Drawing" and be prepared to discuss.
2. Obtain a copy of handout sheet #1 "Piping Terms" and define terms.
3. If you have difficulty with handout sheet, see your instructor for help.

EVALUATION:

Given the necessary tools and a list of terms and equipment, you will define with 100% accuracy piping terms. Definitions must meet the standards set forth in "Process Piping Drawing".

STUDENT COMPETENCY SHEET

PD Unit B Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: B Basic Piping Data - Symbols

COMPETENCY STATEMENT: Knowledge of piping symbols.

PERFORMANCE OBJECTIVE: Given the necessary tools and quiz sheet without references the student will identify symbols of fittings and values with 100% accuracy. All answers must meet the standards set forth in "Process Piping Drawing".

LEARNING ACTIVITIES:

1. Read pages 17-19 in "Process Piping Drawing" and be prepared to discuss.
2. Study Handout Sheet #401, 402, 403, 404, 405 and 406.
3. Take written Quiz 1-Q.
4. Should you score less than 100% on the quiz, review activity #1 and retake quiz.

EVALUATION:

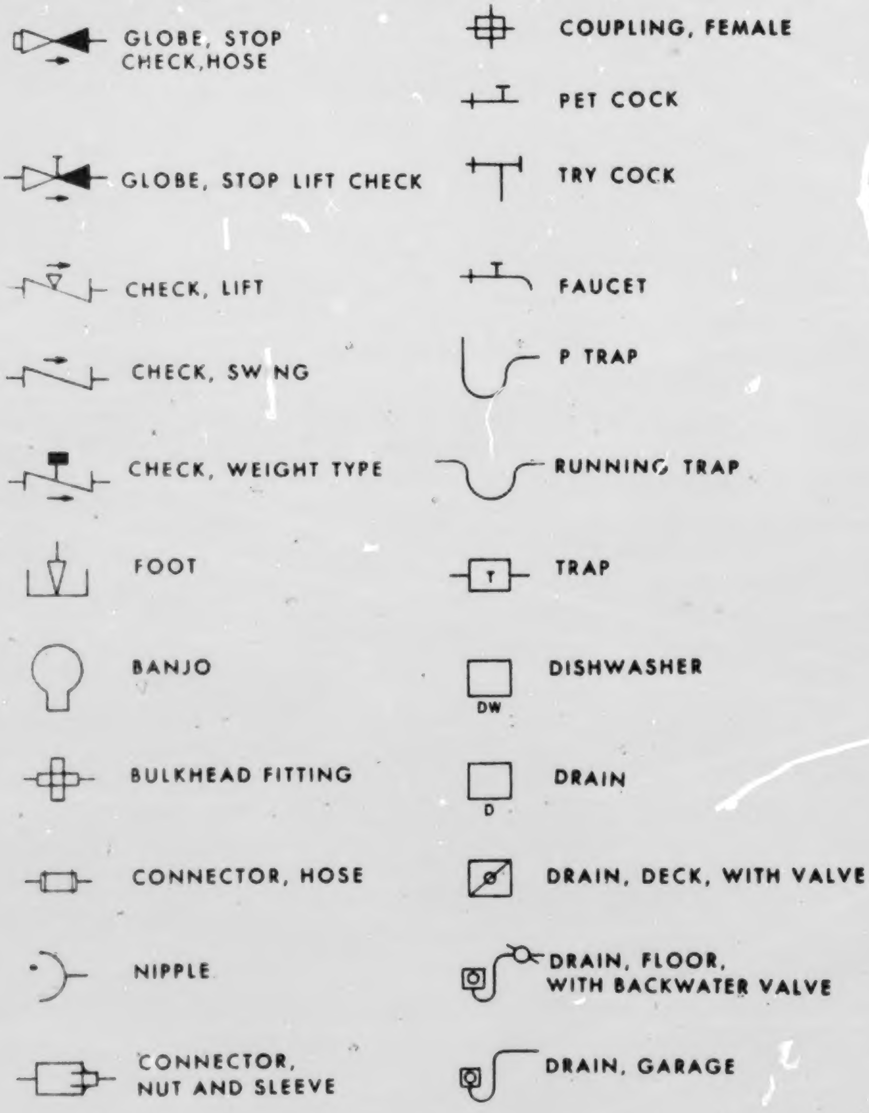
Given the necessary tools and quiz sheet without references the student will identify symbols of fittings and values with 100% accuracy. All answers must meet the standards set forth in "Process Piping Drawing".

HANDOUT SHEET #401

PD Unit B Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: B Basic Piping Data - Symbols

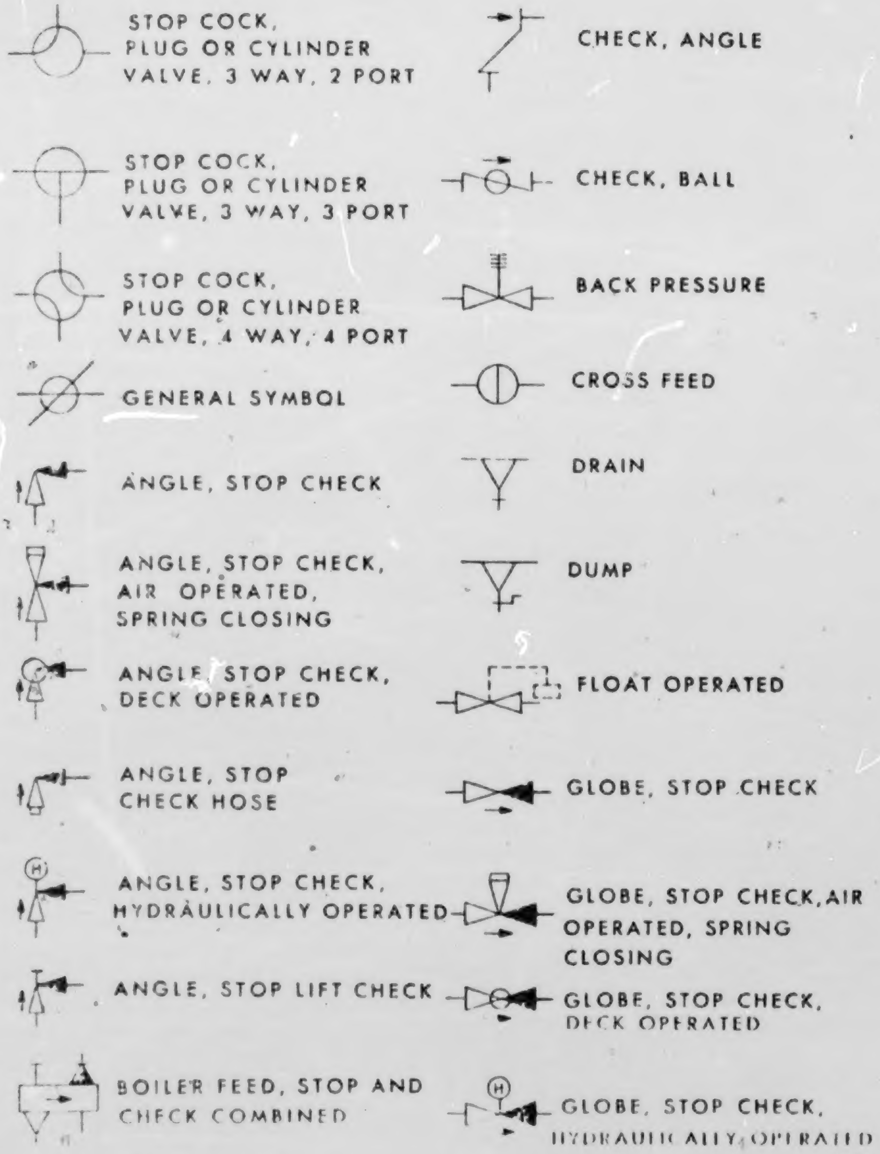


HANDOUT SHEET #402

PD Unit B Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: B Basic Piping Data - Symbols


STOP COCK, PLUG OR CYLINDER VALVE, 3 WAY, 2 PORT
STOP COCK, PLUG OR CYLINDER VALVE, 3 WAY, 3 PORT
STOP COCK, PLUG OR CYLINDER VALVE, 4 WAY, 4 PORT
GENERAL SYMBOL
ANGLE, STOP CHECK
ANGLE, STOP CHECK, AIR OPERATED, SPRING CLOSING
ANGLE, STOP CHECK, DECK OPERATED
ANGLE, STOP CHECK HOSE
H
ANGLE, STOP CHECK, HYDRAULICALLY OPERATED
ANGLE, STOP LIFT CHECK
BOILER FEED, STOP AND CHECK COMBINED
CHECK, ANGLE
CHECK, BALL
BACK PRESSURE
CROSS FEED
DRAIN
DUMP
FLOAT OPERATED
GLOBE, STOP CHECK
GLOBE, STOP CHECK, AIR OPERATED, SPRING CLOSING
GLOBE, STOP CHECK, DECK OPERATED
H
GLOBE, STOP CHECK, HYDRAULICALLY OPERATED

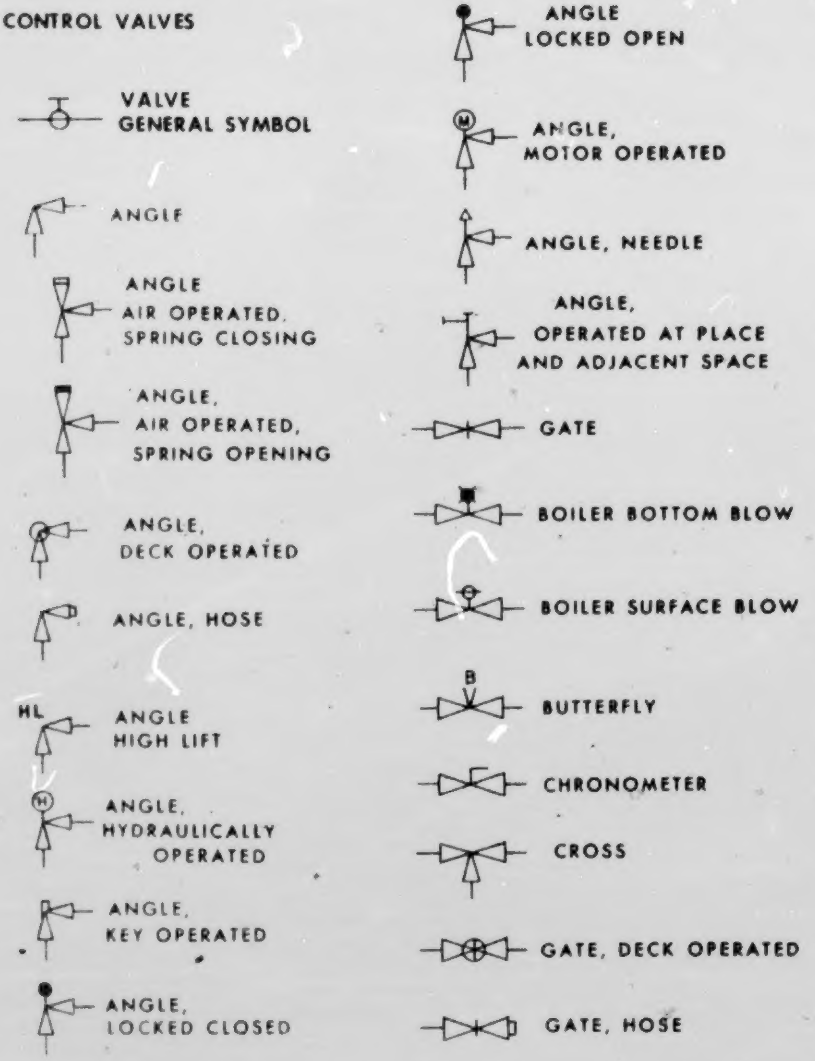
HANDOUT SHEET #403

PD Unit B Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: B Basic Piping Data - Symbols

CONTROL VALVES

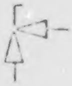


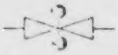
HANDOUT SHEET #404

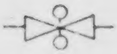
PD Unit B Comp 1 of 1

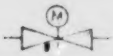
SPECIALIZATION: Piping Drawing

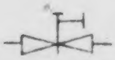
UNIT: B Basic Piping Data - Symbols

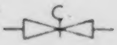

GATE, ANGLE

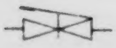

GATE, LOCKED CLOSED

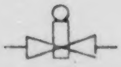

GATE, LOCKED OPEN

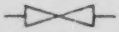

GATE, MOTOR OPERATED

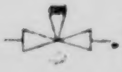

GATE, OPERATED AT PLACE AND ADJACENT SPACE

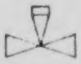

GATE, QUICK CLOSING

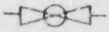

GATE, QUICK OPENING

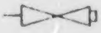

GATE, SLUICE

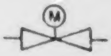

GLOBE

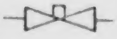

GLOBE, AIR OPERATED SPRING CLOSING

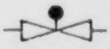

GLOBE, AIR OPERATED, SPRING OPENING

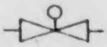

GLOBE, DECK OPERATED

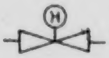

GLOBE, HOSE

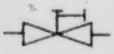

GLOBE, MOTOR OPERATED

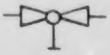

GLOBE, KEY OPERATED

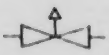

GLOBE, LOCKED CLOSED

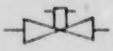

GLOBE, LOCKED OPEN


GLOBE, HYDRAULICALLY OPERATED


GLOBE, OPERATED AT PLACE AND ADJACENT SPACE


MICROMETER


NEEDLE

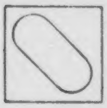

PISTON ACTUATED VALVE (SUITABLE FOR ADDITION OF CONTROL PIPING)

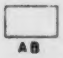
HANDOUT SHEET #405

PD Unit B Comp 1 of 1

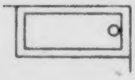
SPECIALIZATION: Piping Drawing

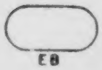
UNIT: B Basic Piping Data - Symbols


BATH. ANGLE TUB

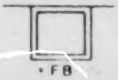


BATH, ARM

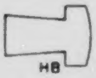

BATH, CORNER



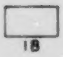
BATH, EMERGENCY



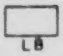
BATH, FOOT



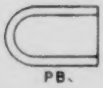
BATH, HUBBARD



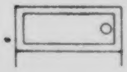
BATH, INFANTS

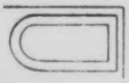


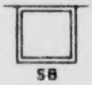
BATH, LEG



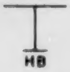
BATH, PRENATAL


BATH, RECESSED

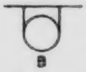

BATH, ROLL RIM



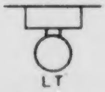
BATH, SITZ



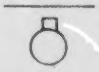
BIBB, HOSE

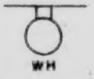


BIDET

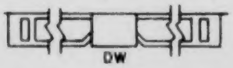


WATER CLOSET, LOW TANK

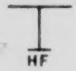

WATER, CLOSET, NO TANK



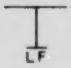
WATER CLOSET, WALL HUNG



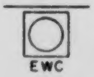
DISHWASHER



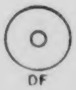
FAUCET, HOSE



FAUCET, LAWN



FOUNTAIN, DRINKING AND ELECTRIC WATER COOLER



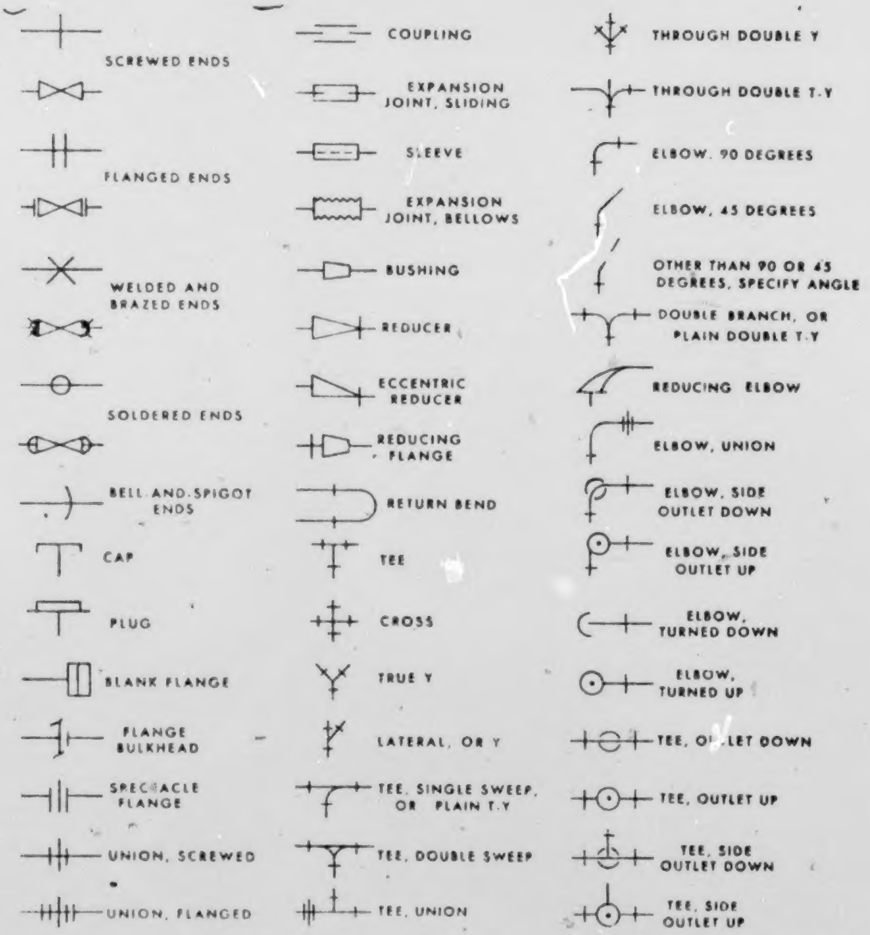
FOUNTAIN, DRINKING, PEDESTAL

HANDOUT SHEET #406

PD Unit B Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: B Basic Piping Data - Symbols



Reprinted from *General Drafting,* Department the Army Technical Manual, TM 5–230; Department of the Air Force Technical Order TO 00–25–103. October 1962.

STUDENT COMPETENCY SHEET

PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data

COMPETENCY STATEMENT: Demonstrates a knowledge of single line and double line piping drawing.

PERFORMANCE OBJECTIVE: Given a written exam and reference, student will be able to draw single and double line drawings with 100% accuracy. The drawings must meet the standards set forth in "Process Piping Drawing".

LEARNING ACTIVITIES:

1. Read pages 9-26 in "Process Piping Drawing" and be prepared to discuss.
2. Draw Fig. 2-2a, 2-2b, 2-3, 2-5, 2-6, 2-8, and 2-9. Student is to choose the proper scale.
3. Draw Fig. 2-11, 2-12, 2-13, 2-15. Student is to choose the proper scale.
4. Submit drawings for grading.
5. If you have problems with activities 1-3, ask the instructor for additional help.

EVALUATION:

Given a written exam and reference, you will be able to draw single and double line drawings with 100% accuracy. Drawings must meet the standards set forth in your text "Process Piping Drawing".

FIGURE 2-2A

PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data

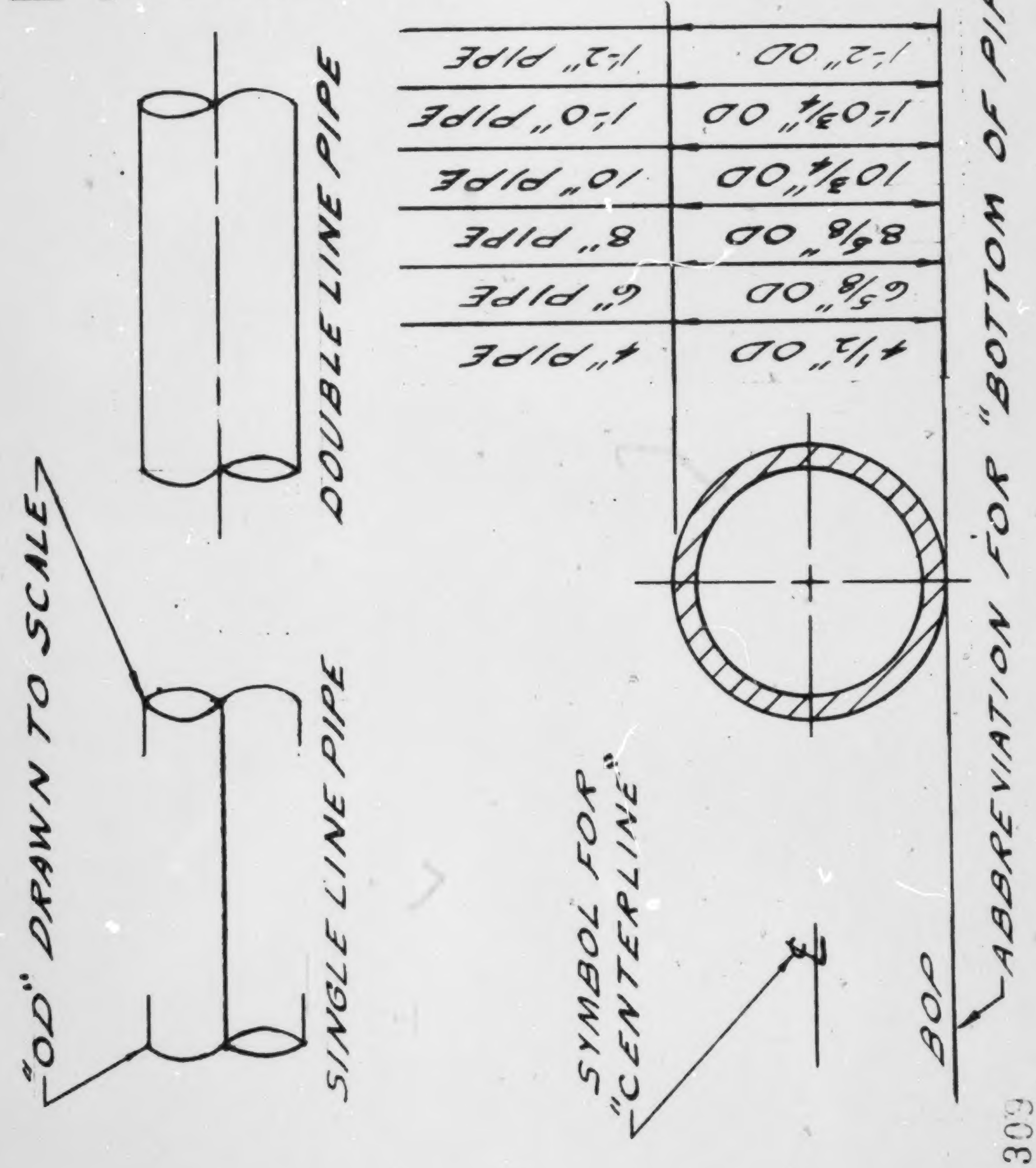
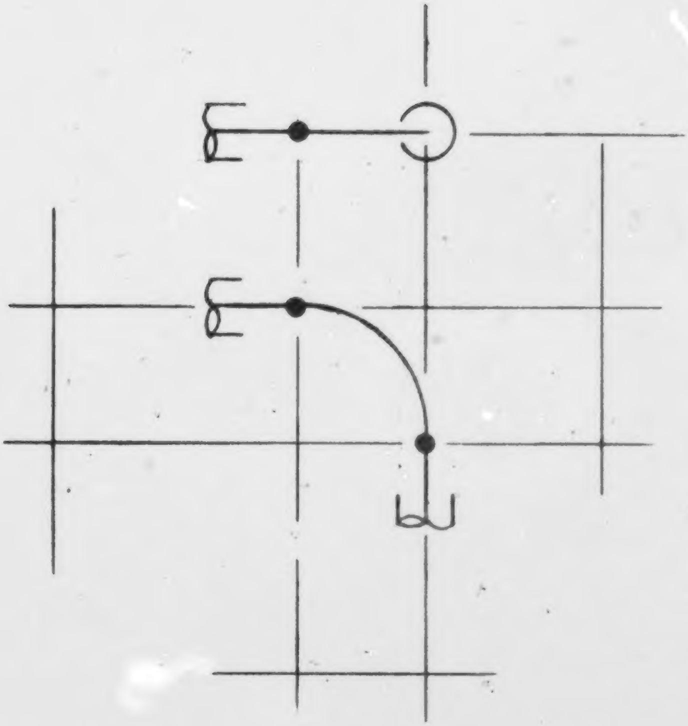


FIGURE 2-2B

PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data



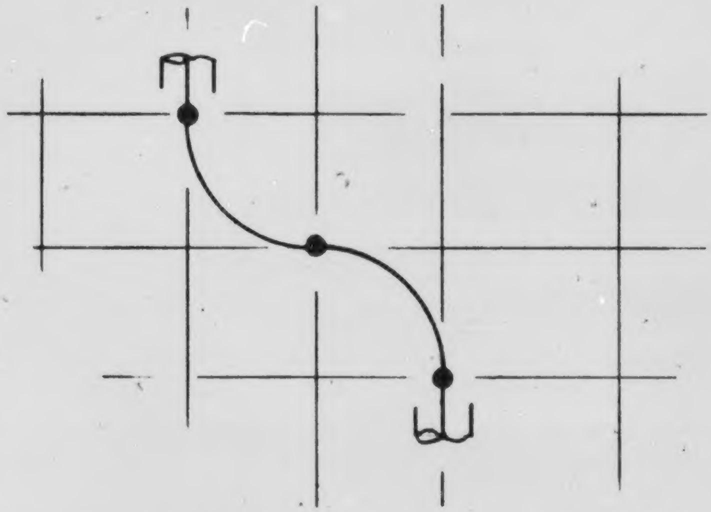
DIRECTIONS: THE ABOVE SHOWS A SIMPLE 90° ELL'S SIDE AND PLAN VIEWS. DRAW THE TWO END VIEWS AND BOTTOM VIEW.

FIGURE 2-3

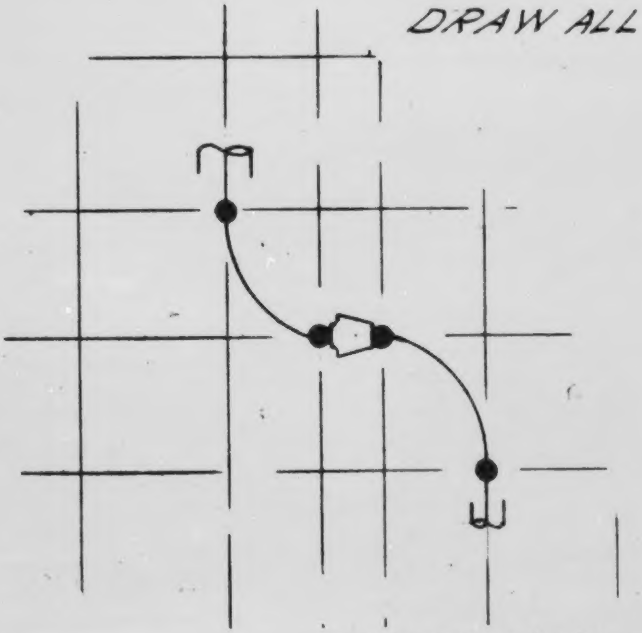
PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data



DIRECTIONS: THE ABOVE HAS AN ELEVATION OF TWO 90° ELL'S WELDED TOGETHER. DRAW ALL FOUR PROJECTIONS.



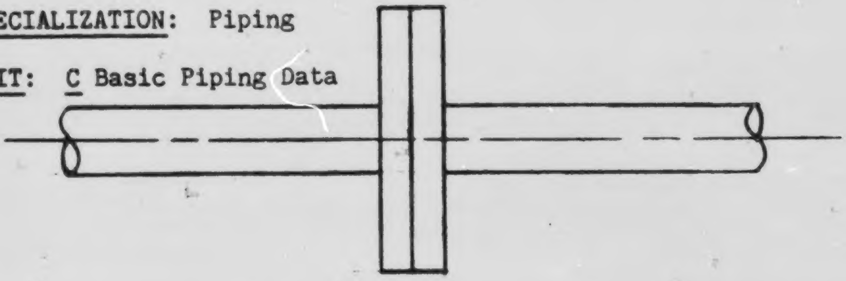
DIRECTIONS: THE ABOVE HAS A CONCENTRIC REDUCER WITH ELL'S WELDED TO BOTH ENDS. DRAW THE TOP, BOTTOM AND BOTH END VIEWS.

FIGURE 2-5

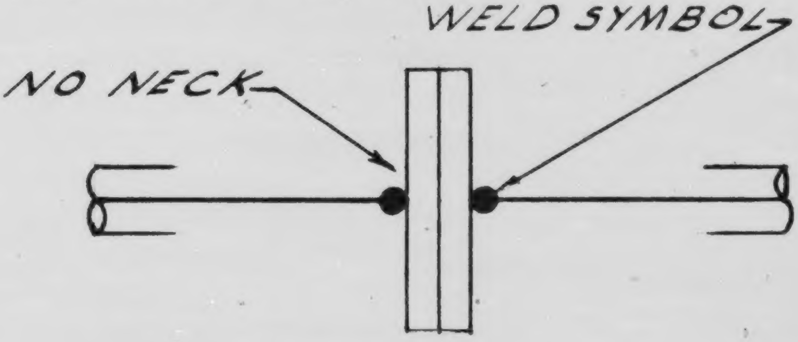
PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

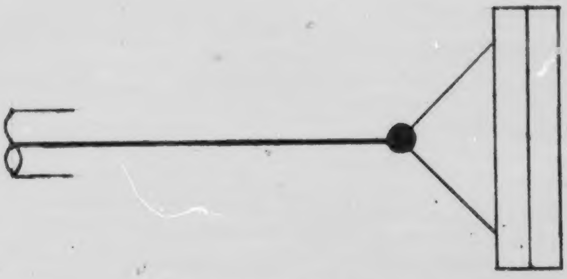
UNIT: C Basic Piping Data



SLIP-ON FLANGES
DOUBLE LINE PIPING



SLIP-ON FLANGES
SINGLE LINE PIPING



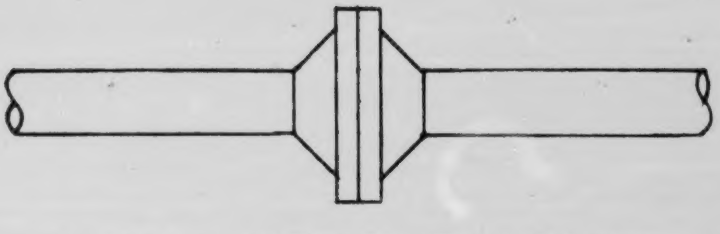
BLIND FLANGE
CONNECTED TO A WELD NECK

FIGURE 2-6

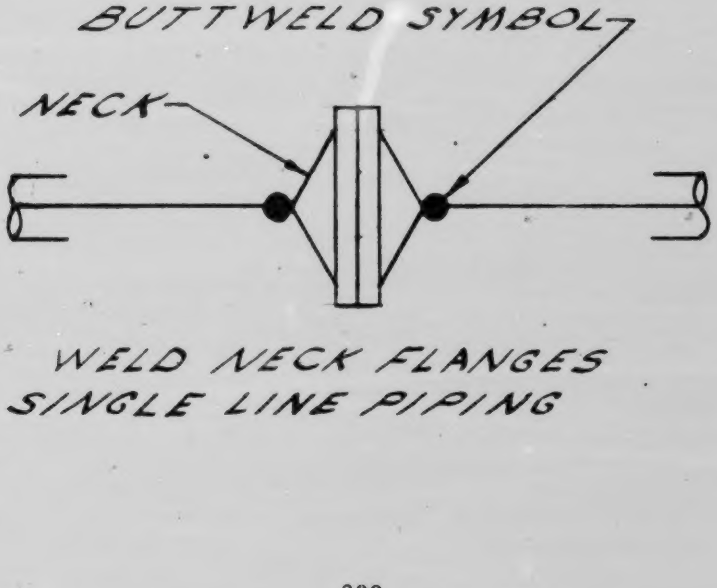
PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data



WELD NECK FLANGES
DOUBLE LINE PIPING



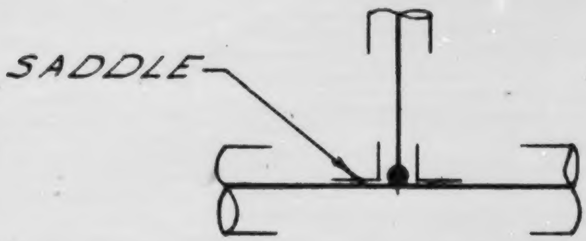
WELD NECK FLANGES
SINGLE LINE PIPING

FIGURE 2-8

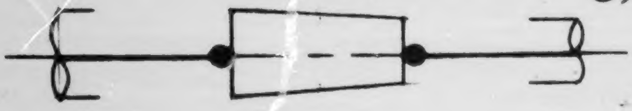
PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

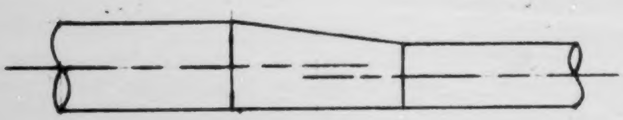
UNIT: C Basic Piping Data



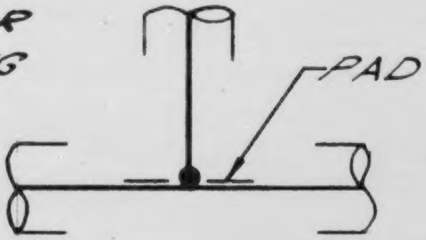
STUB-IN REINFORCED
WITH A WELD SADDLE
SINGLE LINE



CONCENTRIC REDUCER
SINGLE LINE PIPING



ECCENTRIC REDUCER
DOUBLE LINE PIPING



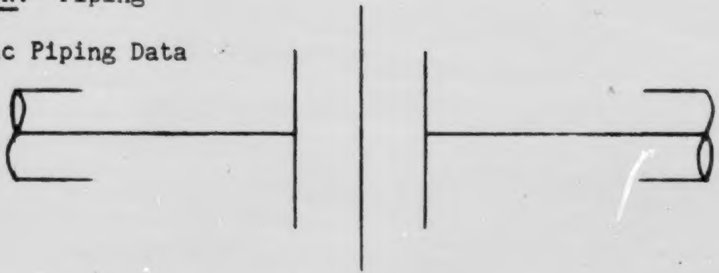
STUB-IN REINFORCED
WITH A "REINFORCING PAD"
SINGLE LINE

FIGURE 2-9

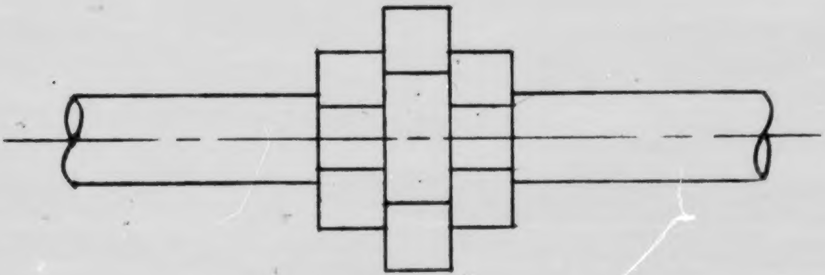
PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

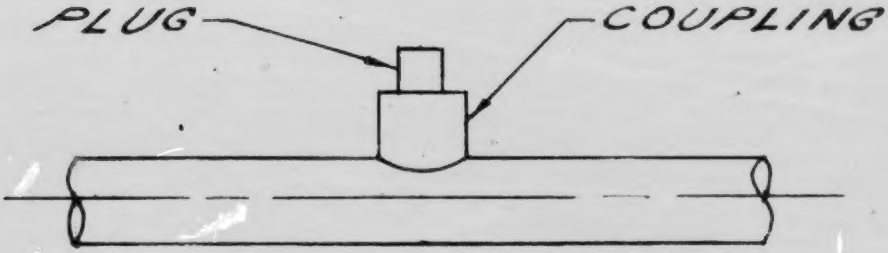
UNIT: C Basic Piping Data



UNION
SINGLE LINE



UNION
DOUBLE LINE



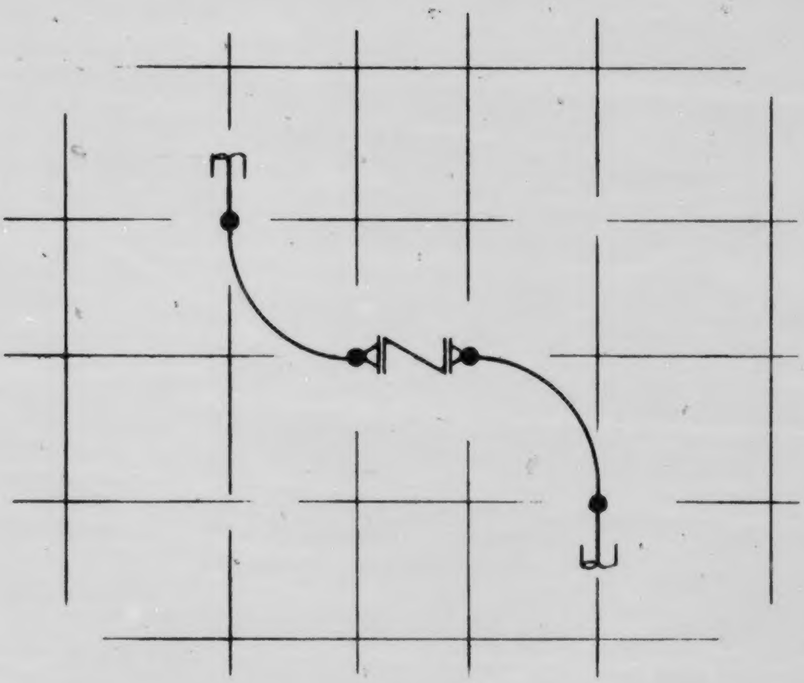
PIPE PLUG

FIGURE 2-11

PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data

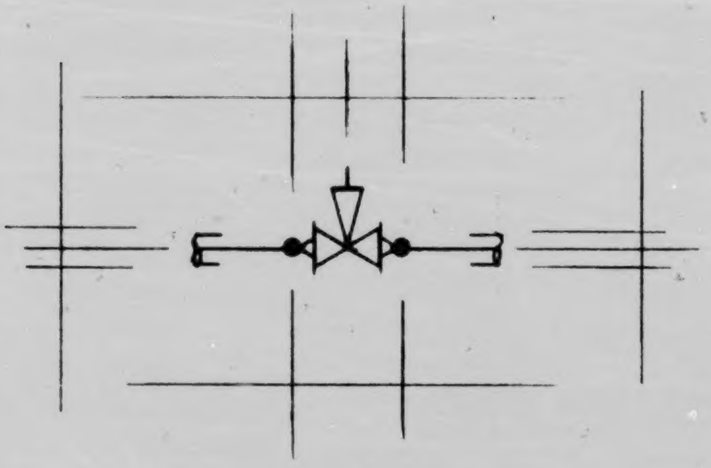


DIRECTIONS: THE ABOVE SHOWS A FLANGED CHECK VALVE, FLANGES, 90° ELBOWS & SOME PIPE WELDED TO THE ELLS. DRAW THE OTHER FOUR VIEWS.

PD Unit C Comp 1 of 1

SPECIALIZATION: Piping

UNIT: C Basic Piping Data



DIRECTIONS: THE ABOVE SHOWS A FLANGED GATE VALVE WITH FLANGES BOLTED TO BOTH ENDS. PROJECT THE TOP BOTTOM AND BOTH END VIEWS.

STUDENT COMPETENCY SHEET

PD Unit D Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: D Projection

COMPETENCY STATEMENT: Demonstrates knowledge of piping projection.

PERFORMANCE OBJECTIVE: Given the necessary tools and worksheet "Projection Exercise", the student will draw with 100% accuracy and references the problems. All work must meet the standards set forth in "Process Piping Drawing".

LEARNING ACTIVITIES:

1. Draw study sheet 2-32.
2. The following problems are single line. Use Chapter 11 of your text as a reference. Scale all drawings 3/8=1'0" with 10" and 6" pipe sizes.
3. Should you have difficulty with the first set of problems Figures 2-19, 2-20, 2-21, 2-22, 2-23, 2-24, 2-25, 2-26, review with the instructor and proceed to activity 4.
4. Draw problems 2-27, 2-28, 2-29, 2-30, and 2-31.

EVALUATION:

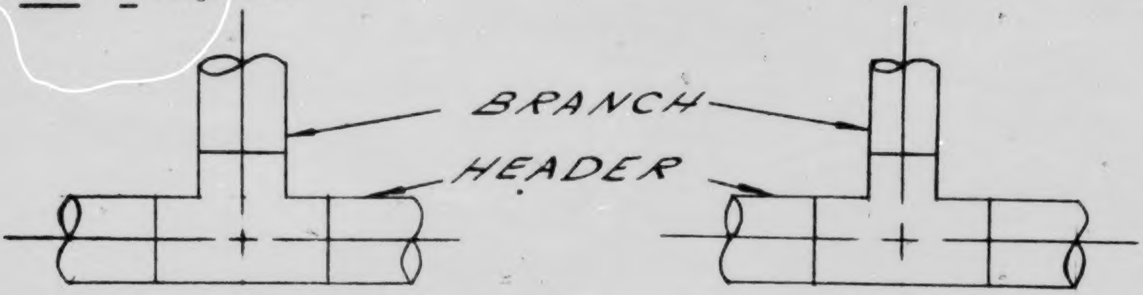
Given the necessary tools and worksheet "Projection Exercise", the student will draw with 100% accuracy and references the problems. All work must meet the standards set forth in "Process Piping Drawing".

FIGURE 2-19

PD Unit D Comp 1 of 1

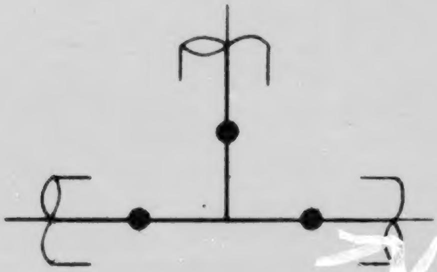
SPECIALIZATION: Piping Drawing

UNIT: D Projection

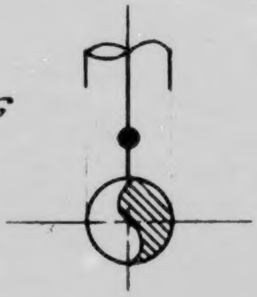


STRAIGHT TEE
DOUBLE LINE

REDUCING TEE
DOUBLE LINE



TEE- STRAIGHT OR REDUCING
SINGLE LINE



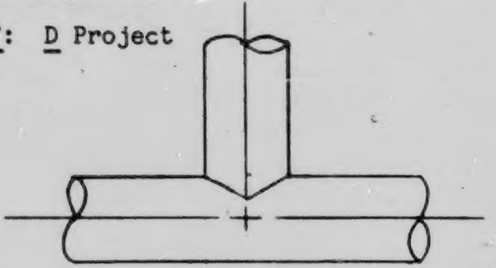
END VIEW
SINGLE LINE

FIGURE 2-20

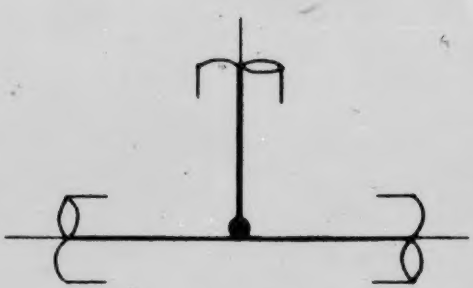
PD Unit D Comp 1 of 1

SPECIALIZATION. Piping Drawing

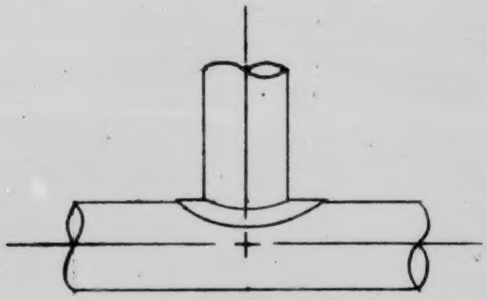
UNIT: D Project



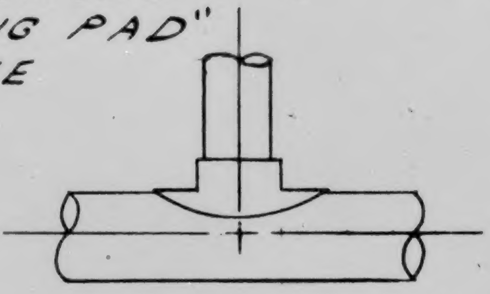
STUB-IN
DOUBLE LINE



STUB-IN
SINGLE LINE



STUB-IN REINFORCED
WITH A "REINFORCING PAD"
DOUBLE LINE



STUB-IN REINFORCED
WITH A WELD SADDLE
DOUBLE LINE

FIGURE 2-21

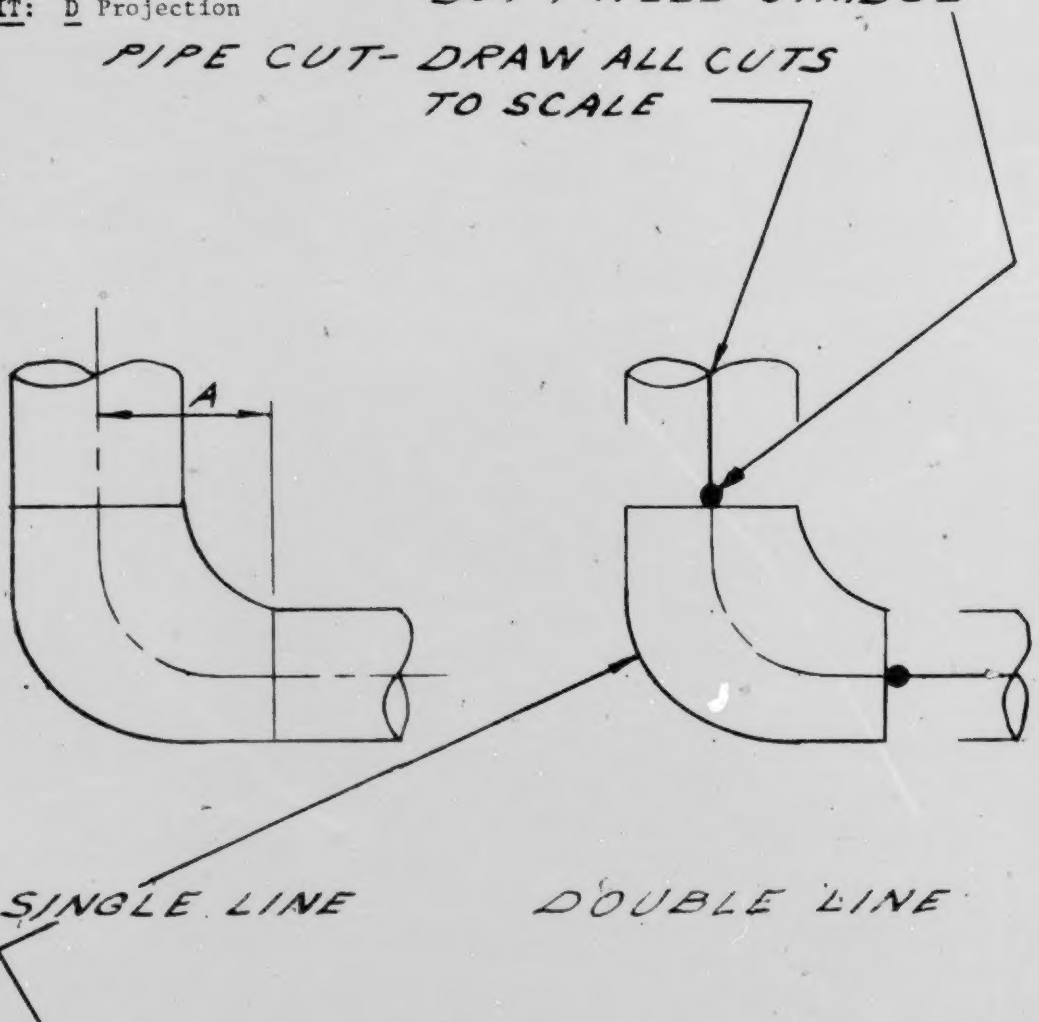
PD Unit D Comp 1 of 1

SPECIALIZATION: Piping Drawing

UNIT: D Projection

NOTE SINGLE LINE BUTTWELD SYMBOL

PIPE CUT- DRAW ALL CUTS TO SCALE



SINGLE LINE   DOUBLE LINE

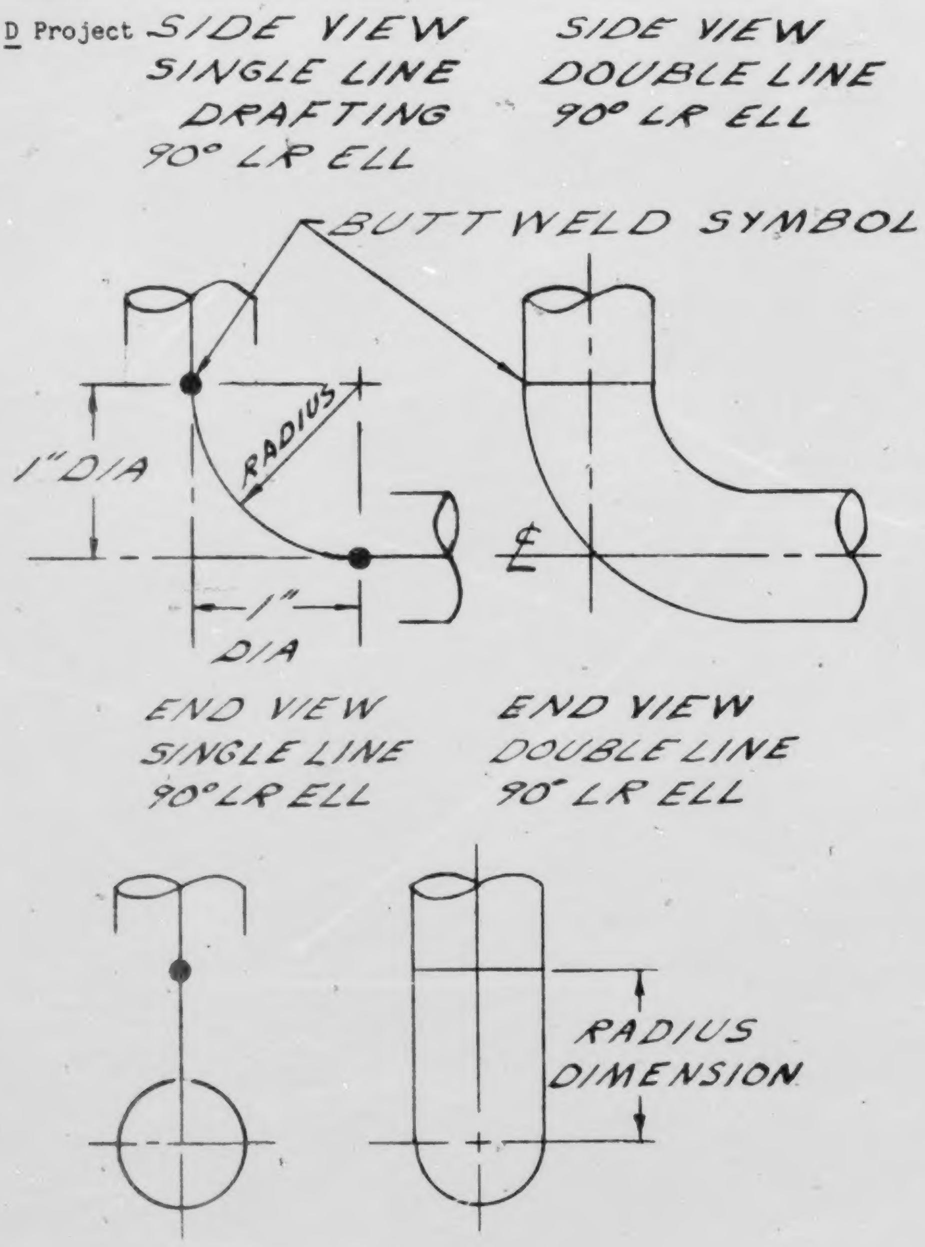
NOTE: ALL REDUCING FITTINGS ARE DRAWN DOUBLE LINE EVEN IN SINGLE LINE PIPING

FIGURE 2-22

PD Unit D Comp 1 of 1

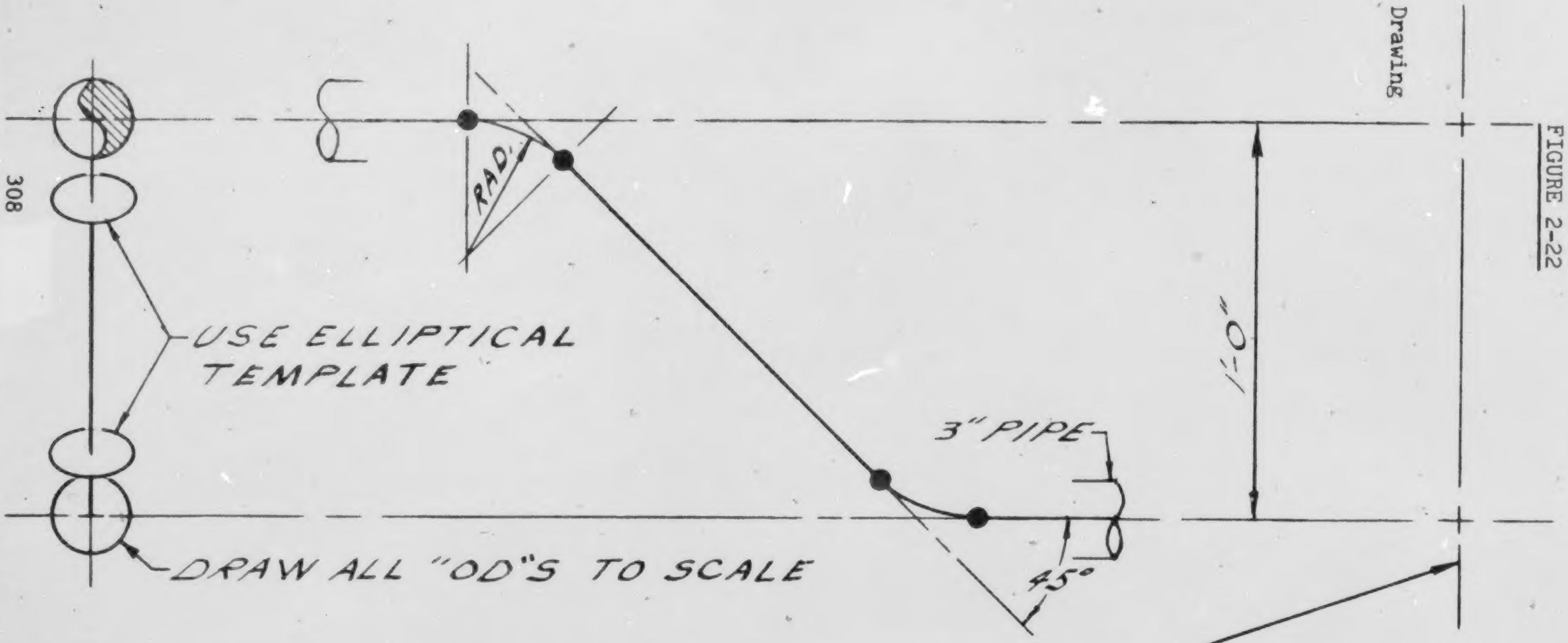
SPECIALIZATION: Piping Drawing

UNIT: D Project



PD Unit D Comp 1 of 1
SPECIALIZATION: Piping Drawing
UNIT: D Projection

FIGURE 2-22



USE ELLIPTICAL TEMPLATE

DRAW ALL "OD"S TO SCALE

SIDE VIEW
SINGLE LINE

STUDENT IS TO
DRAW THIS VIEW
SINGLE LINE

NOTE:
STUDENT TO DRAW
VIEWS DOUBLE
LINE

SIDE VIEW
DOUBLE LINE

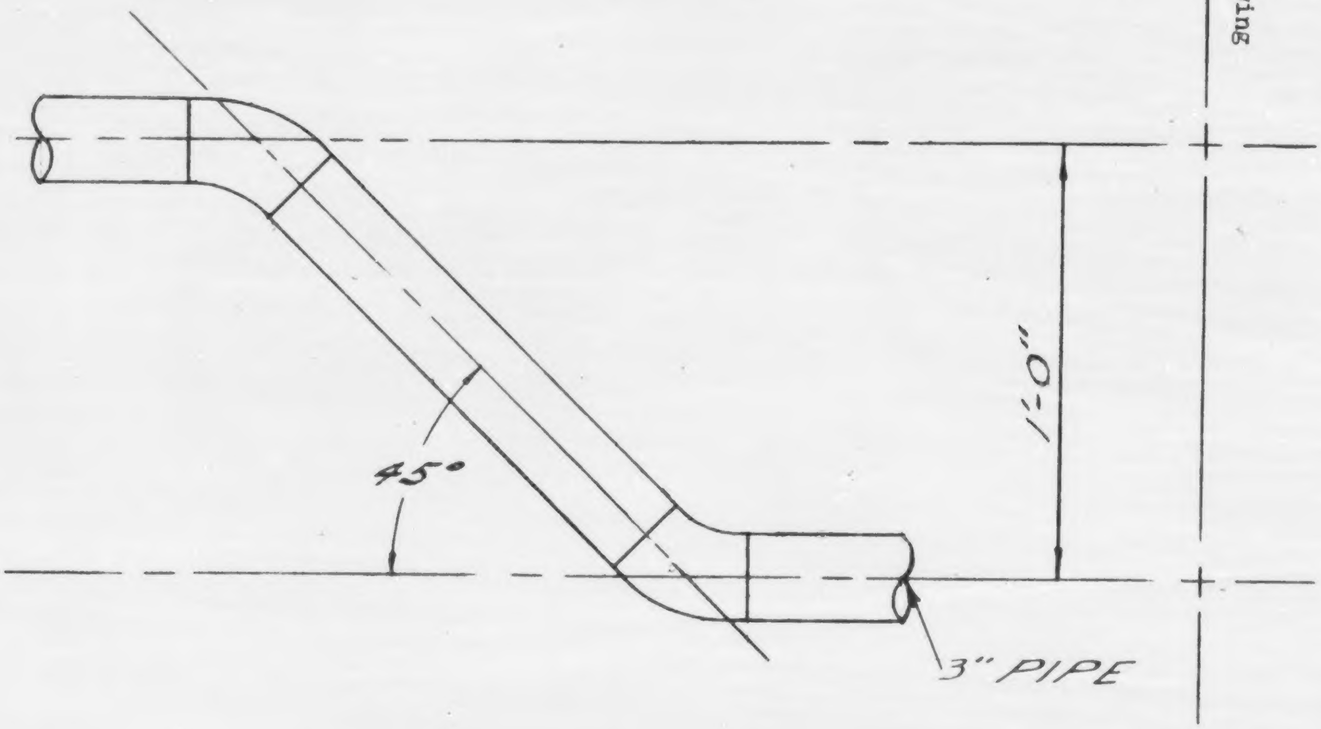


FIGURE 2-23

PART V

ELECTRICAL AND ELECTRONIC DRAFTING

STUDENT COMPETENCY SHEET

ED Unit A Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: A Techniques and Lettering

COMPETENCY STATEMENT: Demonstrates knowledge of the techniques and lettering used in electrical and electronics drawing.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 1-23 "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take a written Quiz 1-Q on techniques and lettering. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

QUIZ 1-Q

ED Unit A Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: A Techniques and Lettering

5 Points each

Answer the following questions. You must score a minimum of 80%. No references may be used.

1. Name two basic functions of the triangle (tool).
2. What is the fundamental function of the protractor?
3. What is the correct position of the ruling pen?
4. Are dimension lines heavier than center line?
5. What is the basic difference between the isometric and perspective projections? How do they differ from orthographic projections?
6. What size radius would be used for drawing the curved plate of a capacitor?
7. What sizes are the two important angles in resistor construction?
8. Should a large quantity of ink normally be applied to a pen? Why?
9. When ruling lines, should the pen point be applied directly to the junction of the guiding edge and the drawing surface? Explain your answer.
10. What is the first step in the production of an ink drawing?
11. What is good work procedure for ink drawings?
12. Aside from neat alignment, what is the most important consideration in producing good lettering?
13. Should the outer edge of letters be equidistant from each other? Why?
14. How much space is generally left between words? Between lines or words?

QUIZ 1-Q (CON'T)

ED Unit A Comp 1 of 1

15. Turn back to Fig. 5.1 and examine carefully. Which symbol of the symbols covered in Chap. 2 is incorrectly shown?

16. What is the primary function of a template?

17. Why should templates be thoroughly examined prior to purchasing?

18. For rapid and precise template application, what fundamental guide is required?

19. Which type of template was specifically designed for fast ink work?

ANSWER SHEET 1-Q

ED Unit A Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drafting

UNIT: A Techniques & Lettering

5 Points each

1. To facilitate the drawing of vertical and of angular lines.
2. Measurement of angles.
3. Perpendicular to surface with slight tilt in direction of motion.
4. No; the same weight.
5. All corresponding parallel lines of isometric are of equal length. Orthographic projections are single-plane views; others are 3-dimensional.
6. Plate size.
7. 30 and 60
8. No; may dry before being consumed; will leave high mound of ink.
9. No; ink may run under guide and produce blotches.
10. Pencil sketch.
11. Working from top to bottom and left to right.
12. Proper spacing of characters.
13. No; good lettering requires uneven spacing to achieve balance between adjacent letter areas.
14. A space equivalent to letter M or W, One-half letter height.

ANSWER SHEET 1-Q (CON'T)

ED Unit A Comp 1 of 1

15. Relay.

16. To assist the draftsman in the rapid production of symbols.

17. Yes

18. Horizontal reference

19. Leroy

STUDENT COMPETENCY SHEET

ED Unit B Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: B Pictorial Drawing

COMPETENCY STATEMENT: Demonstrates knowledge of pictorial drawing used in "Electrical and Electronic Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 24-39 in "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written Quiz 2-Q on pictorial drawing. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

QUIZ 2-Q

ED Unit B Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: B Pictorial Drawing

1. What is the basic function of a pictorial diagram?
2. To what scale are pictorials of small units generally drawn?
3. Should component placement be exact on pictorials which are to be used for reference only?
4. Need all the pictorials of a group be measured and drawn independently?
5. Give the title for the isometric of a finished unit that shows the case, handles, etc.
6. What is one of the best drawing media of printed circuit patterns? Why?
7. For what reason are prompted circuit patterns drawn up to a 4:1 scale?
8. Who uses the scale-reference dimensions on printed circuits?
9. On a printed circuit scale 2:1, what is the nominal minimum dimension for connecting strips and the spaces between them?
10. Once a printed circuit pattern is completed. How may the draftsman expedite the printed circuit board drawing?
11. If a pantograph is not available, how may waveforms be enlarged or reduced?
12. Why is the line of action on a graph made comparatively heavy?

ANSWER SHEET 2-Q

ED Unit B Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: B Pictorial Drawing

1. To show the correlation between the physical form of an electronic apparatus and its diagram.
2. 2:1 or larger.
3. No. It is more important to show clearly the connections.
4. No. Others may be directly derived from the first one drawn.
5. "Final Assembly".
6. Mylar film, because of its dimensional stability.
7. You reduce errors when photographically reduced to scale 1:1.
8. The photographer.
9. 1/16 or .062"
10. Be tracing the printed circuit pattern.
11. By the graph paper process.
12. To make it stand out.

STUDENT COMPETENCY SHEET

ED Unit C Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: C Device Symbols

COMPETENCY STATEMENT: Demonstrates Knowledge of Device symbols used in "Electronics and Electrical Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 40-68 in "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written Quiz 3-Q on device symbols. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

QUIZ 3-Q

ED Unit C Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: C Device Symbols

___Points each

Answer the following questions. You must score a minimum of 80%.

No references may be used.

1. Define the meaning of "one microvolt". Give its abbreviation.
2. Give the words for which the following are abbreviations: ma, kw, and Mv.
3. What is the significance of an arrowhead near the midpoint of a resistor symbol?
4. Which portion of the capacitor shybol connects to ground when a ground is indicated?
5. What is the significance of two solid lines adjacent to the coil symbol? Of two dotted lines?
6. What dictates transformer symbol sizes?
7. Are arrowheads of relay and vibrator symbols open or filled in?
8. Describe the general symbol for motors and generators?
9. A vacuum tube symbol contains a cathode, signal grid, screen grid, and plate. What would this type be called?
10. Describe the basic difference between an incandescant lamp symbol and a signaling lamp symbol.
11. The direction of the arrowhead on a transistor symbol indicates what important relationship to d-c voltage?
12. May the separable connector symbol be used in conjunction with a crystal symbol to indicate a plug-in type of crystal?
13. What is the important difference between the symbols for the male and female parts of receptacles and plugs?

ED Unit C Comp 1 of 1

14. If a particular drawing were being sought in a file, by what identification would it be located?

15. Drawing 23007-A has been modified. What is its new identity?

16. What constitutes basic component identifications?

17. What is added to the basic component identifications?

18. How is the general sequence of numbers that are applied to individual components arrived at?

19. What is the main function of "notes" on drawings?

20. Besides the basic identification, what other identifying features are applied to controls, switches, relays, etc.?

21. The leads of which component are frequently identified by notations of color?

22. When windings of power transformer are identified as to voltage, where should the voltage designation be applied?

23. In a complex system, identify the second capacitor in the receiver, the fourth resistor in the transmitter, the first transformer in the power supply, and the second light(pilot) in the control unit. Assign your own group designations.

ANSWER SHEET 3-Q

ED Unit C Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: C Device Symbols

___Points each

1. One-millionth of one volt. MV.
2. Millismpere, kilowatt, and megavolt.
3. Indicates variable resistor.
4. The curved portion.
5. Solid lines indicate magnetic core, Dotted lines indicate ferrite core.
6. The particular diagram requirements.
7. Filled in.
8. Circle labeled MOT or GEN.
9. Tetrode.
10. Envelope of signaling lamp symbol is flat on the bottom.
11. Polarity.
12. Yes
13. Males are filled in, females are left open.
14. Its assigned number (including the issue suffix).
15. 23007-B.
16. Letter-number combination, for example, C4.
17. Component value: e.g., C4 100.
18. By numbering from left to right as they appear on the drawing.
19. To provide additional data in a way that relieves congestion on the drawing.

ANSWER SHEET 3-C (CON'T)

ED Unit C Comp 1 of 1

20. Abbreviated words indicating function.

21. Power transformer.

22. Within the applicable winding, near the center.

23. Assuming assigned groups as follows: receiver 100, transmitter 200, power supply 300, and control unit 400; than they would be called C102, R204, T301, and I401.

STUDENT COMPETENCY SHEET

ED Unit D Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: D Production Drawings

COMPETENCY STATEMENT: Demonstrates knowledge of production drawings used in "Electrical and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by instructor.

LEARNING ACTIVITIES:

1. Read pages 69-107 in "Electrical and Electronics Drawing"and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written quiz on production drawings. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

STUDENT COMPETENCY SHEET

ED Unit E Comp 1 of 2

SPECIALIZATION: Electrical and Electronics Drawing

UNIT: E Block (Flow) Diagrams

COMPETENCY STATEMENT: Demonstrates knowledge of block diagrams used in "Electrical and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 108-128 in "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written Quiz 4-Q on block diagrams. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

QUIZ 4-Q

ED Unit E Comp 1 of 2

SPECIALIZATION: Electrical and Electronic Drawing

UNIT E Block (Flow) Diagrams

___Points each

1. What is the basic purpose of the block diagram?
2. May symbols be employed in conjunction with blocks?
3. Are the lines used to draw blocks heavier or lighter than the connecting lines? For what reason?
4. Describe the possible exception in the answer to Question 3.
5. When symbols and blocks are combined in one diagram, which type of symbols is recommended, the standard or the single-line?
6. Give 2 reasons for your answer to the above question.
7. How may futurity, or alternate-unit application be indicated?
8. How may groups of blocks in a complex diagram be emphasized in instructional material calling for ready visualization?
9. Name the 2 principle methods of providing contrast between various block groupings.
10. What is the function of the arrow and when should it be used?
11. What is the basic advantage of the single-line diagram over the block diagram?
12. May all single-line symbols also be employed in schematic diagrams? Why?

ANSWER SHEET 4-Q

ED Unit E Comp 1 of 2

SPECIALIZATION: Electrical and Electronic Drawing

UNIT E Block (Flow) Diagrams

1. To provide a generalized picture of complex apparatus or organization.
2. Yes
3. Heavier to provide desired emphasis.
4. The reverse is true when the path of signal travel is to be emphasized.
5. Single-line symbol.
6. Single-line symbols are simpler; they require less time to draw.
7. By drawing blocks and connections with dashed lines.
8. Blocks in each group are shaded.
9. Shading and crosshatching.
10. Indicates path of travel and should be used only where necessary for clarity.
11. Single-line diagram permits more detailed functional view.
12. No. Because they are not complete enough.

STUDENT COMPETENCY SHEET

ED Unit E Comp 2 of 2

SPECIALIZATION: Electrical and Electronics Drawing

UNIT: E The elementary or schematic diagram

COMPETENCY STATEMENT: Demonstrates knowledge of schematic used in "Electrical and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 129-173 in "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written Quiz 5-Q on schematic diagrams. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written test and do the problems assigned by the instructor.

QUIZ 5-Q

ED Unit E Comp 2 of 2

SPECIALIZATION: Electrical and Electronics Drawing

UNIT: E The elementary or schematic diagram

___Points each

1. What should be done before placing any symbols on the drawing paper?
2. What relationship should exist between symbols?
3. May symbols be drawn in a diagonal plane?
4. When, if at all, may symbols vary in size?
5. May draftsman rearrange a schematic layout? If so, for what purpose?
6. What may be done in order to reduce the number of connecting lines in a drawing?
7. If the functions of a single relay are disturbed at various points of a schematic, what may be done to simplify the drawing?
8. If a vacuum tube designated V22 has three separate functions and each function is located in a different part of the schematic, how are the three sections labeled?
9. What is the difference between an inductance used at UHG and that used at the lower frequencies as each will appear in a schematic diagram?

ANSWER SHEET 5-Q

ED Unit E Comp 2 of 2

SPECIALIZATION: Electrical and Electronics Drawing

UNIT: E The elementary or schematic diagram

1. The drawing area should be properly apportioned to accommodate all the required symbols.
2. Symbols should be symmetrically spaced from each other.
3. No, symbols may only be drawn in a vertical or horizontal plane.
4. Normally, uniform symbol size is required. Special applications, like filament strings, may call for symbol enlargement.
5. Yes, if it results in a simpler and clearer diagram.
6. Symbols may be rearranged, divided, or expanded.
7. The various relay contacts may be segregated from the main relay symbol and placed close to their points of function.
8. V22A, V22B, and V22C.
9. The lower frequency inductance is drawn as a typical coil, while the UHF inductance is shown as a pictorial section, as illustrated in Figs. 8.21 and 8.24.

STUDENT COMPETENCY SHEET

ED Unit F Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: F Miniaturization and Microelectronics

COMPETENCY STATEMENT: Demonstrates knowledge of miniaturization and microelectronics used in "Electrical and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 174-216 in "Electrical and Electronics Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written quiz on miniaturization and microelectronics. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4 ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

STUDENT COMPETENCY SHEET

ED Unit G Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: G Industrial Controls and Automation

COMPETENCY STATEMENT: Demonstrates knowledge of industrial controls and automation used in "Electrial and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 217-243 in "Electrical and Electronic Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take a written quiz on industrial controls and automation. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

STUDENT COMPETENCY SHEET

ED Unit H Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: H Drawings for the Electric Power Field

COMPETENCY STATEMENT: Demonstrates knowledge of drawings for the electric power field.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 244-266 in "Electrical and Electronic Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written quiz on drawings for the electric power field. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities with 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

STUDENT COMPETENCY SHEET

ED Unit I Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: I Electrical Drawing for Architectural Plans.

COMPETENCY STATEMENT: Demonstrates knowledge of drawings used for architectural plans.

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 267-295 in "Electrical and Electronic Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written quiz on electrical drawing for architectural plans. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

STUDENT COMPETENCY SHEET

ED Unit J Comp 1 of 1

SPECIALIZATION: Electrical and Electronic Drawing

UNIT: J Graphical Representation of Data

COMPETENCY STATEMENT: Demonstrates knowledge of graphs used in "Electrical and Electronics Drawing".

PERFORMANCE OBJECTIVE: Given the necessary materials and equipment you will be able to take a written quiz and do the problems assigned by the instructor.

LEARNING ACTIVITIES:

1. Read pages 296-339 in "Electrical and Electronic Drawing" and be prepared to discuss.
2. Observe and participate in lecture/demonstration given by the instructor.
3. Take written quiz on graphical representation of data. You must score a minimum of 80%. No references may be used.
4. Read the directions and do the problems assigned by the instructor. These problems must be done with 100% accuracy.
5. If you have problems with activities 1-4, ask the instructor for help and additional activities if needed.

EVALUATION:

Given the necessary materials and equipment you will take a written quiz and do the problems assigned by the instructor.

PART V1

JIGS AND FIXTURES

STUDENT COMPETENCY SHEET

JF Unit A Comp 1 of 1

SPECIALIZATION: Jigs and Fixtures

UNIT: A Design

COMPETENCY STATEMENT: Knowledge of major factors in design of jigs and fixtures.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn the major factors in design of jigs and fixtures, and take a quiz with no references used, on the major factors in design of jigs and fixtures, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read pages 11-12 in "Jigs and Fixtures", Volume I and be prepared for class discussion.
2. Complete Quiz 1-Q on the following page.
3. If you have problems with activities 1 and 2, ask the teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn the major factors in design of jigs and fixtures, and take a quiz with no references used, on the major factors in design of jigs and fixtures, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 1-C

JF Unit A Comp 1 of 1

UNIT: A Design

JIGS AND FIXTURES

___Points each

List the 3 major factors that influence the design of tools.

1.

2.

3.

How can the jigs or fixtures be best designed for the most efficient use by the operator?

1.

2.

3.

4.

5.

6.

7.

8.

List ways to assure accuracy in work pieces.

1.

2.

3.

4.

5.

STUDENT COMPETENCY SHEET

JF Unit B Comp 1 of 1

SPECIALIZATION: Jigs and Fixtures

UNIT: B Classes of Fixtures

COMPETENCY STATEMENT: Knowledge of classes of fixtures.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn the classes of fixtures and take a quiz with no references used, about the classes of fixtures with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read pages 9-10 of "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete Quiz 2-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities if necessary.

EVALUATION:

Given the necessary materials, you will learn the classes of fixtures and take a quiz with no references used, about the classes of fixtures with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 2-Q

JF Unit B Comp 1 of 1

UNIT: B Classes of Fixtures

CLASSES OF FIXTURES

____Points each

1. What determines classes of fixtures?

2. What are some of the machines fixtures are used upon?

3. Name some of the milling machines which use fixtures.

    1.

    2.

    3.

    4.

    5.

    6.

    7.

    8.

    9.

4. Auxiliary vice jaws are generally made of what material?

    Then it is ________________.

5. Name 5 fixtures and tell briefly what they do.

    1.

    2.

    3.

    4.

    5.

STUDENT COMPETENCY SHEET

JF Unit C Comp 1 of 2

SPECIALIZATION: Jigs and Fixtures

UNIT: C Drill Jigs

COMPETENCY STATEMENT: Knowledge of drill jigs.

PERFORMANCE STATEMENT: Given the necessary materials, you will learn the classes of drill jigs and take a quiz with no references used, about the classes of drill jigs with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read pages 7-9 of "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete quiz 3-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn the classes of drill jigs and take a quiz with no references used, about the classes of drill jigs with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 3-Q

JF Unit C Comp 1 of 2

UNIT: C Drill Jigs

_____Points each

1. What are the two classes that jigs are usually divided into?

    1.

    2.

2. List several kinds of drill jigs.

    1.

    2.

    3.

    4.

    5.

3. What are the two general types of drill jigs?

    1.

    2.

4. Briefly: What is an open jig?

    __________do__________a closed jig?

    __________do__________an indexing or rotary jig?

    __________do__________a combination jig?

    __________do__________a boxing jig?

STUDENT COMPETENCY SHEET

JF Unit C Comp 2 of 2

SPECIALIZATION: Jigs and Fixtures

UNIT: C Use of Jigs and Fixtures

COMPETENCY STATEMENT: Knowledge of uses of jigs and fixtures.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn the uses of jigs and fixtures and take a quiz with no references used, about the uses of jigs and fixtures, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read pages 6-7 of "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete Quiz 4-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn the uses of jigs and fixtures and take a quiz with no references used, about the uses of jigs and fixtures, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 4-C

JF Unit C Comp 2 of 2

UNIT: C Use of Jigs and Fixtures

____Points each

1. Briefly what is a jig?

2. Briefly what is a fixture?

3. List a few operations resulting in the use of fixtures?

STUDENT COMPETENCY SHEET

JF Unit D Comp 1 of 3

SPECIALIZATION: Jigs and Fixtures

UNIT: D Tool designer

COMPETENCY STATEMENT: Knowledge of the tool designer.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn about the tool designer and take a quiz, with no references used, about the tool designer with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read page 5 of "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete Quiz 5-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn about the tool designer and take a quiz, with no references used, about the tool designer with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 5-Q

JF Unit D Comp 1 of 3

UNIT: D Tool designer

____Points each

1. What does the tool designer do to express his ideas graphically?

2. What is usually the chief duty of the tool designer?

3. What abilities and knowledge must the tool designer need to do his job?

STUDENT COMPETENCY SHEET

JF Unit D Comp 2 of 3

SPECIALIZATION: Jigs and Fixtures

UNIT: D Tool Design

COMPETENCY STATEMENT: Knowledge of how tool design affects the product.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn how tool design affects the product and take a quiz, with no references used, on how tool design affects the product, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read page 4 of "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete Quiz 6-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn how tool design affects the product and take a quiz, with no references used, on how tool design affects the product, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 6-Q

JF Unit D Comp 2 of 3

UNIT: D Tool Design

____Points each

1. How are production costs reduced?
    1.
    2.
2. How is duplication of precision parts attained through controlled accuracy?
    1.
    2.
    3.
3. How does tool design improve the design of the product?
    1.
    2.

STUDENT COMPETENCY SHEET

JF Unit D Comp 3 of 3

SPECIALIZATION: Jigs and Fixtures

UNIT: D Tool Design

COMPETENCY STATEMENT: Knowledge of how product quantity affects tool design.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn how product quantity affects tool design and take a quiz, with no references used on how product quantity affects tool design, with 80% accuracy. All answers must meet the standards set forth in Jigs and Fixtures.

LEARNING ACTIVITIES:

1. Read pages 3-4 in "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete the quiz on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn how product quantity affects tool design and take Quiz 7-Q, with no references used, on how product quantity affects tool design, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 7-Q

JF Unit D Comp 3 of 3

UNIT: D Tool Design

____Points each

1. Explain the pro and con of how quantity affects tool design, briefly.

STUDENT COMPETENCY SHEET

JF Unit E Comp 1 of 1

SPECIALIZATION: Jigs and Fixtures

UNIT: E Material and Machines

COMPETENCY STATEMENT: Knowledge of how materials and machines affect tool design.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn how materials and machines affect tool design, and take a quiz, with no references used on how materials and machines affect tool design, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read page 3 in "Jigs and Fixtures", Volume I and prepare for class discussion.
2. Complete Quiz 8-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and addition activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn how materials and machines affect tool design, and take a quiz, with no references used on how materials and machines affect tool design, with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 8-Q

JF Unit E Comp 1 of 1

UNIT: E Material and Machines

____Points each

1. What influences the design of a tool?

2. Name 3 purposes that machine tools serve?

    1.

    2.

    3.

STUDENT COMPETENCY SHEET

JF Unit F Comp 1 of 1

SPECIALIZATION: Jigs and Fixtures

UNIT: F Purpose of Tool Design

COMPETENCY STATEMENT: Knowledge of the purpose of tool design.

PERFORMANCE OBJECTIVE: Given the necessary materials, you will learn the purpose of tool design and take a quiz, with no references used, on tool design with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

LEARNING ACTIVITIES:

1. Read page 1 in "Jigs and Fixtures", Volume I and prepare to discuss.
2. Complete Quiz 9-Q on the following page.
3. If you have problems with activities 1 and 2, ask your teacher for help and additional activities, if necessary.

EVALUATION:

Given the necessary materials, you will learn the purpose of tool design and take a quiz, with no references used, on tool design with 80% accuracy. All answers must meet the standards set forth in "Jigs and Fixtures".

QUIZ 9-Q

JF Unit F Comp 1 of 1

UNIT: F Purpose of Tool Design

____Points each

1. Name 7 of the most important purposes of tool design.

    1.

    2.

    3.

    4.

    5.

    6.

    7.

2. Explain briefly the purpose of tool design.

PART VII

HEATING AND AIR CONDITIONING

STUDENT COMPETENCY SHEET

HVAC Unit A Comp 1 of 1

SPECIALIZATION: Heating, Ventilation and Air Conditioning

UNIT: A Common Heat Systems

COMPETENCY STATEMENT: General knowledge of heat systems

PERFORMANCE OBJECTIVE: The student will be able to demonstrate an understanding of the advantages and disadvantages of the following heating systems by passing an exam with 85% accuracy using no reference.

LEARNING ACTIVITIES:

1. Read and study pages 232 thru 239 in "Architectural Drafting and Design.
2. Listen to lecture by teacher.
3. Study table I comparison of heating systems page 238.
4. Describe the type of heating system you have in your place of residence.
5. Complete attached Quiz 1-Q using no reference. Upon completion have your teacher grade and discuss.
6. A minimum score of 85% must be achieved, if not restudy items 1 and 3 and acquire another from teacher.

EVALUATION:

The student will be able to demonstrate an understanding of the advantages and disadvantages of the following heating systems by passing an exam with 85% accuracy using no reference.

QUIZ 1-A

HV&AC Unit A Comp 1 of 1

UNIT: A Common Heat Systems

COMMON HEAT SYSTEMS

1. Give a written description of each of the following general types of heating systems.

   A. Warm Air-______________________________

   B. Hot Water______________________________

   C. Steam______________________________

   D. Electric______________________________

   E. Solar______________________________

2. List one advantage and one disadvantage for each of the following heating systems.

QUIZ 1-A (CON'T)

HV&AC Unit A Comp 1 of 1

UNIT: A Common Heat Systems

SYSTEM	ADVANTAGE	DISADVANTAGE
A. Warm Air		
B. Hot Water Baseboard		
C. Electric Baseboard		
D. Electric Ceiling Cables		
E. Solar		

MATCHING THE FOLLOWING

1. Thermostat
2. Return Air
3. Supply Air
4. Radiant Heat
5. Humidistat
6. Air Filter
7. Plenum
8. Hot Water Baseboard
9. Heat Pump
10. Ventilation

a. Requires extensive use of Piping
b. Area used as an air resevoir
c. Extracts dust from the air
d. Controls moisture
e. Controls temperature
f. Heated air sent to room
g. Operates on principle of refrigerator
h. Air mixed with return air
i. Electric ceiling cables
j. Is never taken from rest-rooms

STUDENT COMPETENCY SHEET

HV&AC Unit B Comp 1 of 1

SPECIALIZATION: Heating Ventilating and Air Conditioning

UNIT: B Symbols & Abbreviations

COMPETENCY STATEMENT: Demonstrates a knowledge of HV & AC symbols and common abbreviations.

PERFORMANCE OBJECTIVE:

1. Given a list of HV & AC items sketch a freehand symbol for each using no references.
2. Given a list of HV & AC terms write the abbreviation for each using no reference.

The above performance objectives must be achieved by passing an exam by a min. score of 85%.

LEARNING ACTIVITIES

1. Study attached handout
2. Attend class drill
3. Acquire exam 2-Q from teacher and complete
4. If a min. score of 85% is not achieved repeat step one and acquire another exam from teacher.

EVALUATION:

1. Given a list of HV & AC items sketch a freehand symbol for each using no references.
2. Given a list of HV & AC abbreviations write the term for each using no reference.

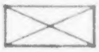
The above performance objectives must be achieved by passing an exam by a min. score of 85%.

HANDOUT FOR UNIT B COMP 1 OF 1

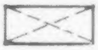
Instructions-Study the following symbols and abbreviations.

HV & AC Symbols

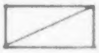
1. Supply Duct Up ---------------



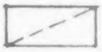
2. Supply Duct Down---------------



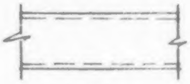
3. Return Duct Up----------------



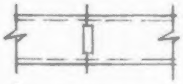
4. Return Duct Down---------------



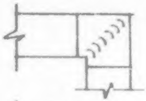
5. Duct Liner (Insulation)--------



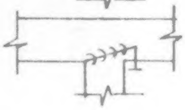
6. Volume Damper------------------



7. Air Turn-----------------------

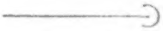


8. Air Extractor------------------

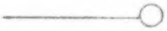


9. Thermostat---------------------

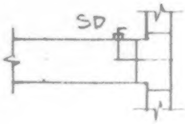
10. Pipe Down---------------------



11. Pipe Up-----------------------



12. Splitter Damper---------------



HV & AC Abbreviations

1.	CFM	CUBIC FEET PER MINUTE
2.	GPM	GALLONS PER MINUTE
3.	MBH	1000 BTU PER HOUR
4.	BTU	BRITISH THERMAL UNIT
5.	SA	SUPPLY AIR
6.	RA	RETURN AIR
7.	OA	OUTSIDE AIR
8.	HV & AC	HEATING VENTILATING & AIR CONDITIONING

QUIZ 2-Q

HY&AC Unit B Comp 1 of 1

SYMBOLS AND ABBREVIATIONS

1. Sketch the symbol for each of the following HV & AC items.

    1. Supply Duct Up
    2. Supply Duct Down
    3. Return Duct Up
    4. Return Duct Down
    5. Duct Liner (Insulation)
    6. Volume Damper
    7. Air Turn
    8. Air Extractor
    9. Thermostat
    10. Pipe Down
    11. Pipe Up
    12. Splitter Damper

2. Write the term for each of the following abbreviations

    1. CFM
    2. GPM
    3. MBH
    4. BTU
    5. SA
    6. RA
    7. OA
    8. HV & AC

STUDENT COMPETENCY SHEET

HV&AC Unit C Comp 1 of 1

SPECIALIZATION: Heating Ventilating and Air Conditioning

UNIT: C HV & AC Terms

COMPETENCY STATEMENT: Demonstrates knowledge of common HV & AC terms as used in HV & AC Engineering.

PERFORMANCE OBJECTIVE: Given the following list of common HV & AC terms the student will demonstrate a knowledge of the meaning of these terms by passing a matching test with a minimum of 90%.

LEARNING ACTIVITIES

1. Read chapter 25 pages 232 thru 245 "Architectual Drafting & Design".
2. Listen to lecture by teacher.
3. Study attached handout.
4. Acquire Quiz 3-Q from teacher and complete
5. If score is less than 85% review steps one and three and then acquire a new test from instructor.

EVALUATION

The student will pass exam "HV & AC terms" with a minimum score of 85% using no reference.

HANDOUT FOR UNIT C COMP 1 OF 1

Study the following HV & AC terms

1. Duct-A sheetmetal enclosure used for transporting air either to or from conditioned rooms. (Use transparency)
2. Return Air-Air recycled to the conditioning unit for reconditioning.
3. Supply Air-Air being distributed to room from conditioning unit for the purpose of heating or cooling.
4. Duct Liner-An insulation added to the inside ductwork usually ½-1" thick. Its purpose is to control noise and heat loss in the ductwork.
5. Plenum Chanber-A metal box used as a collecting station for air.
6. CFM-A measuring unit for the distribution of air. One cubic foot of air is supplied or returned every minute.
7. BTU-A Measurmenting unit for heat-The amount of heat it takes to raise one pound of water 1 degree F. at atmospheric pressure.
8. GPM-A unit for measuring rate of liquid supply or return. The number of gallons of liquid supplied or returned per minute.
9. Heat Loss-The load calculated for heating.
10. Heat Gain-The load calculated for cooling.
11. U-Factor-(Coefficient of heat transmission) The number of BTU that will pass thru a material per degree temperature difference per hour, per sq. ft.
12. Infiltration-Air which seeps in around doors and windows or rushes in when a door is opened. (explain exfiltration)

HANDOUT FOR UNIT C COMP 1 OF 1 (CON'T)

13. Ventilation-Outside air added to the supply air system.
14. Indoor Design Temperature-The temperature that a system is to be sized to maintain indoors. (Usually about 75 degree)
15. Outdoor Design Temperature-The average coldest temperature likely to occur in an average heating season.
16. Design Temperature Difference-The difference between the indoor & outdoor design temperatures.
17. Volume Damper-A control device in ductwork to regulate the CFM flow of air.
18. Air Extractor-A device for changing air direction from the trunk to a branch.
19. Air Turn-A device placed in elbows of ductwork to aid air in turning corners.
20. Exhaust Air-Air extracted from a conditioned room to the outdoors.

QUIZ 3-C

HV&AC Unit C Comp 1 of 1

Match the following HV & AC terms.

1. Duct-
2. Return Air-
3. Supply Air-
4. Duct Liner-
5. Plenum Chamber-
6. CFM-
7. BTU-
8. GPM-
9. Heat Loss-
10. Heat Gain-
11. U-Factor
12. Infiltration-
13. Ventilation
14. Indoor Design Temperature-
15. Outdoor Design Temperature-
16. Design Temperature Difference-
17. Volume Damper-
18. Air Extractor-
19. Air Turn-
20. Exhaust Air-

a. Air recycled to the conditioning unit for reconditioning

b. An insulation added to the inside ductwork usually ½-1" thick. Its purpose is to control noise & heat loss in the ductwork.

c. The load calculated for heating.

d. A measurmenting unit for heat-The amount of heat it takes to raise one pound of water 1 degree F. at atmospheric pressure.

e. Air being distributed to room from conditioning unit for the purpose of heating or cooling.

f. The difference between the indoor & outdoor design temperatures.

g. Outside air added to the supply air system

h. A metal box used as a collecting station for air.

i. A unit for measuring rate of liquid supply or return. The number of gallons of liquid supplied or returned per minute.

j. A control device in ductwork to regulate the CFM flow or air.

k. The average coldest temperature likely to occur in an average heating season.

l. A measuring unit for the distribution of air. One cubic foot of air is supplied or returned every minute.

m. A sheetmetal enclosure used for transporting air either to from conditioned rooms.

n. The load calculated for cooling.
o. (Coefficient of heat transmission) The number of BTU that will pass thru a material per degree temperature difference per hour, per sq. ft.
p. The temperature that a system is to be sized to maintain indoors. (usually about 75 degree)
q. Air which seeps in around doors and windows or rushes in when a door is opened.
r. A device placed in elbows of ductwork to aid air in turning corners.
s. Air extracted from a conditioned room to the outdoors.
t. A device for changing air direction from the trunk to a branch.

STUDENT COMPETENCY SHEET

HV&AC Unit D Comp 1 of 1

SPECIALIZATION: Heating Ventilating & Air Conditioning

UNIT: D Heat Loss Calculation

COMPETENCY STATEMENT: Demonstrates an understanding of heat loss calculation.

PERFORMANCE OBJECTIVE: Given all the necessary related information the student will calculate the heat loss for a room or rooms with 98% accuracy using method described in attached handouts and pass a written exam on heat loss calculation with a minimum score of 85% using no references on either part.

LEARNING ACTIVITIES

1. Read and study attached handouts
2. Listen to lecture by teacher
3. Read pages 239 thru 242-"Architectural Drafting and Design"
4. To better understand "U" Factors study table II coefficients of transmission (U) page 240. Keep in mind the lower the "U" Factor the better in terms of heat loss calculation.
5. Acquire exam from teacher and complete Part I & Part II.
6. If Quiz 4-Q score is less than 85% on written exam Part I or less than 98% accuracy on heat loss calculation problem Part II review steps 1 & 3 and acquire a new exam from teacher.

STUDENT COMPETENCY SHEET (CON'T)

HV&AC Unit D Comp 1 of 1

UNIT: D Heat Loss Calculation

EVALUATION:

Given all the necessary related information the student will calculate the heat loss for a room or rooms with 98% accuracy using method described in attached handouts and pass a written exam on heat loss calculation with a minimum score of 85% using no reference on either part.

HANDOUT FOR UNIT D COMP 1 OF 1

HEAT LOSS CALCULATION

1. During the colder seasons of the year our homes require heating. A thermostat "clocks" on calling for our heating system to heat the room to a certain temperature, let us say 70°. When this 70° is obtained the thermostat will "clock" off. The temperature in the room will begin to drop very slowly. The reason for this drop in temperature is the loss of heat when the temperature eventually drops to a certain point the thermostat will "clock" on again calling for more heat from the heating unit. This loss of heat is termed simply heat loss. The calculation of heat loss is required to size the heating system.

Heat

2. The calculation of ________ loss is required to size the heating system.

3. Heat loss is controlled by four factors: 1. area, 2. "U" factor, 3. temperature, 4. infiltration.

1.area
2."U" factor
3.Temp.
4.Infiltration

4. Heat loss is affected by 4 factors which are: 1.______ 2.________ 3.__________ 4.__________.

Heat Loss

5. Area "U" factor, temperature and infiltration are the 4 factors that affect ________ __________.

6. The basic unit of measurement for heat is the BTU.

. BTU stands for British Thermal Unit.

Heat

8. A British Thermal Unit is the basic unit of measurement for _________.

9. Heat is measured in terms of British_________Units.

10. The amount of heat it takes to raise one pound of water one degree fahrenheit at atmospheric pressure is equal to one BTU.

11. A BTU is equal to the amount of heat it takes to
pound raise one______of water one_______fahrenheit at
degree
atmospheric pressure.

12. Heat loss is expressed in terms of BTU's per hour, sometimes written BTU/HR.

British 13. The term BTU/HR stands for ________ ________ ________
Thermal
Units per ___________.
Hour

14. If a pound of water is heated from 70 degree F. to 71
BTU degree F. it would take the amount of heat equal to
a ____________.

15. If a pound of water is allowed to cool from 71 degree
BTU F. to 70 degree F. the heat lost would be equal to a
___________.

16. A "U" Factor is a term referring to the number of BTU/HR that will pass thru one square foot area of a given material per hour per degree temperature difference.

17. The amount of heat that will pass thru one square foot
"U" area of a given material during a time period of one
hour if the temperature outside was 0 degree F. and
the temperature inside was 1 degree F. is called a
_________Factor.

HANDOUT FOR UNIT D COMP 1 OF 1 (CON'T)

18. For an example the "U" factor for a single glazed window is 1.13.

1.13 19. By the definition of a "U" factor _________(how many) BTU's will pass thru one square foot of window area per hour per degree temperature difference. (single glazed window)

11.3 20. _________BTU/HR would pass thru the window in the above example if the window was 2 feet by 5 feet and there was a one degree temperature difference.

21. The solution to the problem in frame 29 is obtained simply by multiplying 2 x 5 to obtain the square foot area of the window. The square footage (10) was then multiplied by the "U" factor (1.13) and that by the temperature difference.

22. Heat loss that results in the situation described in frame 23 is termed heat loss by conduction. In other heat loss obtained by multiplying the area x "U" factor x the temperature difference is called heat loss by conduction or simply conduction heat loss.

conduction 23. If 36 square feet is multiplied times a "U" factor of 1.13 times a difference in temperature of 70 degree F. the ___________heat loss is calculated.

2847.6 24. The conduction heat loss for the above problem described in frame 23 is _________BTU/HR.

HANDOUT FOR UNIT D COMP 1 OF 1 (CON'T)

25. Heat flows from a warmer to a cooler surface by means of conduction.

26. When a wall is heated by a heating unit the wall serves as a conductor for the heat to escape to the outside.

27. The wall serves as a __________ for heat loss which allows the heat to flow thru the wall and escape to the outside requiring the calculation of __________ loss.

conductor
heat

28. In addition to heat loss by conduction there is heat loss by infiltration.

29. Infiltration is the cold air that leaks in around doors and windows.

30. Two types of heat loss are __________ and __________

conduction
infiltration

31. Infiltration can be calculated by several different ways. The formula we will use will be volume x infiltration coefficient x the temperature difference.

32. The formula for calculating infiltration is the ______ x ______ __________ x __________ __________.

area
"U" factor
Temp. difference

33. Volume is calculated by multiplying width x depth x height.

34. The volume of a room 10' x 16' width and 8' ceiling is ________________ cubic feet.

1280

35. The infiltration coefficient is selected from a table (in this situation of learning the infiltration coefficient will be given to you) and is dependent on two

	things 1. type of window and 2. percent of glass area.
Type area infiltration	36. ____________ and ____________ affect the ____________ coefficient.
	37. The temperature difference is the difference between the outside design temperature and the inside design temperature.
80	38. If the outside design temperature is -5°F. and the inside design temperature is 75°F, the design temperature difference is ____________.
conduction infiltration	39. In summary heat loss can be divided into two parts: 1. ____________ 2. ____________.
Area "U" factor temp difference	40. The formula for calculation conduction heat loss is ___________ x ____________ ___________ x ___________ ___________.
Volume infiltration coefficient temp difference	41. The formula for calculating the heat loss by infiltration is _________ x ___________ ____________ x _________ ________________.
width height	42. The area of a wall is calculated by multiplying the ________________ x ________________.
	43. The "U" factor is selected from a table and is different for each material.
outside inside	44. The design temperature difference is found by subtracting the ______________ design temperature from the ____________________ design temperature.

width
depth
height

45. Volume is obtained by multiplying the __________ x
__________ x __________.

46. Using the following steps calculate the heat loss for the example on the following sheet.

Direction-Use the following steps in calculating the heat loss for the attached problem.

CALCULATION OF HEAT LOSS

176 SQ FT 1. Calculate gross outside wall area. The gross outside wall area is ____________.

27 SQ FT 2. Calculate the window area. The total window area is ________________.

149 SQ FT 3. Subtract window area from gross wall area to obtain net wall area _____________.

70 degree F 4. Obtain design temperature difference by subtracting the outside design temperature from the inside design temperature. The design temperature difference is ____________.

1564 5. Multiply the net wall area by the "U" factor by the design temperature difference to obtain the heat loss by conduction thru the wall. The heat loss by conduction thru outside wall is ____________BTU/HR.

2136 6. Calculate the conduction heat loss thru windows by multiplying the window area by the "U" factor by the design temperature difference. The conduction heat loss thru the windows is __________BTU/HR.

678 7. To calculate the conduction heat loss thru the ceiling multiply the square feet area by the "U" factor by the design temperature difference. The conduction heat loss thru the ceiling is __________BTU/HR.

1219 8. To calculate the heat loss by infiltration multiply the room volume in terms of cubic feet by the infiltration coefficient by the design temperature difference. The Heat loss by infiltration is _______ BTU/HR.

9. No heat loss will be calculated thru the floor. In this example we will assume the space below is another heated room.

10. Since the adjacent rooms are heated to the same temperature no heat loss will be calculated for the interior partitions.

4378 11. The total heat loss by conduction is _________BTU/HR.

1219 12. The total heat loss due to infiltration is __________ BTU/HR.

5597 13. The total calculated heat loss is ______________.

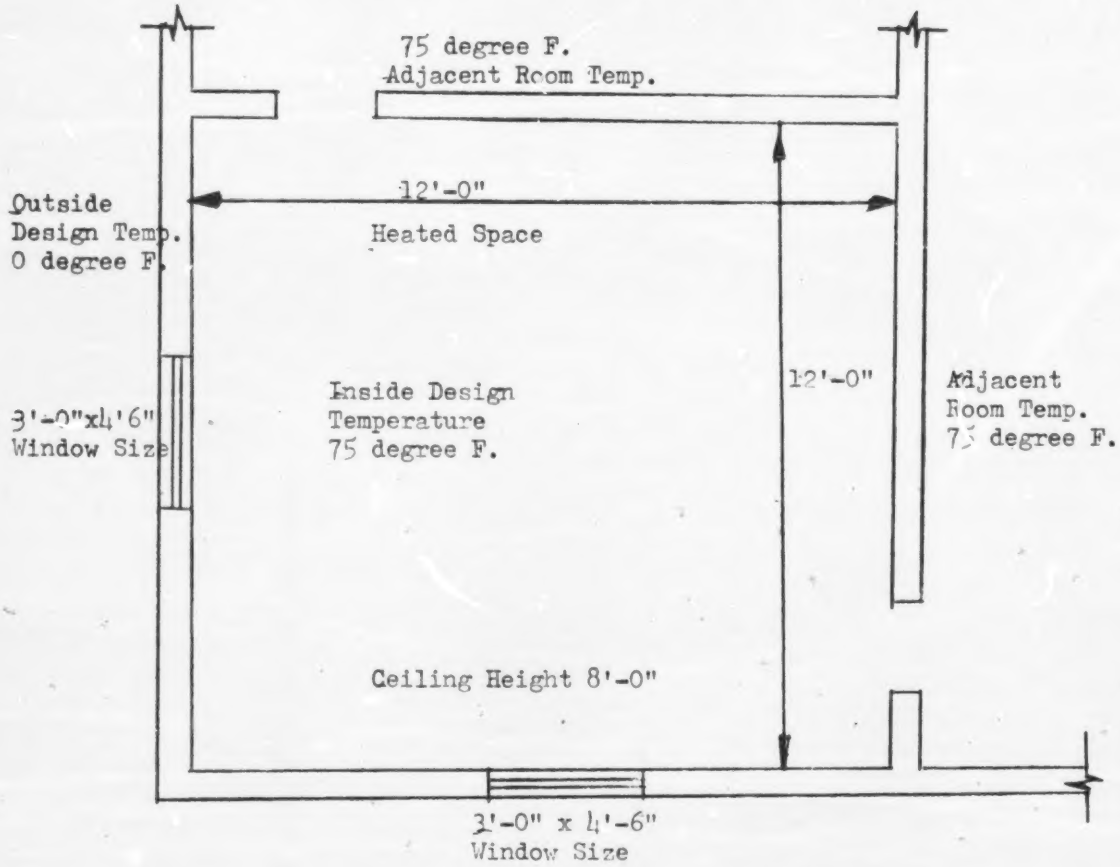
560 14. If a safety factor of 10% is used to assure an adequate estimation of heat loss the answer in number 13 will be multiplied by 10%. A safety factor of __________BTU/HR is added to the answer in number 13
6157 to make a grand total heat loss of ___________.

HEAT LOSS SUMMARY

15. Complete the following chart.

Heat Loss Summary

ITEM	HEAT LOSS BTU/ HR
Outside Walls	
Windows..................	
Ceiling..................	
Infiltration.............	
Subtotal.................	
Safety Factor 10%........	
Total....................	


75 degree F.
Adjacent Room Temp.
12'-0"
Outside Design Temp. 0 degree F.
Heated Space
3'-0"x4'6" Window Size
Inside Design Temperature 75 degree F.
12'-0"
Adjacent Room Temp. 75 degree F.
Ceiling Height 8'-0"
3'-0" x 4'-6" Window Size

DESIGN DATA

"U" Factors---Outside walls---- .26

Ceiling --------- .12

Glass------------1.13

Infiltration Coefficient- .020

QUIZ 4-Q

HV&AC Unit D Comp 1 of 1

HEAT LOSS CALCULATION

1. For calculating the conduction heat loss the formula is the ______________ multiplied by the ___________ factor multiplied by the design _______________ difference.

2. BTU stands for _______________ ____________ _______________.

3. If the indoor design temperature is 75% F. and the design temperature difference is 92 degree F. the outside design temperature is _______________.

4. The unit of measurement for heat is ______________________.

5. The ____________ (larger or smaller) the "U" factor the better in terms of heat loss calculation.

6. The amount of BTUs that will pass thru one square foot of wall per hour per degree fahrenheit is called the coefficient of ______________ or ____________ factor.

7. Heat loss can be divided into two general types which are

   1. ___________
   2. ___________

8. Air that seeps in around doors and windows is termed ____________ when calculating heat loss.

9. The amount of heat it takes to raise one pound of water one degree fahrenheit at atmospheric pressure is a ____________.

QUIZ 4-C (CON'T)

HV&AC Unit D Comp 1 of 1

10. If a wall has a gross area of 100 sq. ft. and has 2 windows 3'-0" x 5'-0" the net nrea of the wall is ________________.

11. If the "U" Factor of the above wall in number 10 is .26 and the design temperature difference is 70 degrees fahrenheit the conduction heat loss for that wall will be __________ BTU/HR.

12. The conduction heat loss thru the windows in problems 10 is ____________ if the "U" Factor is 1.13 and the design temperature difference is 70 degrees fahrenheit.

13. The total conduction heat loss thru the above wall & windows is ____________.

14. The formula for calculating the heat loss by infiltration is the ____________multiplied by the infiltration coefficient multiplied by the design temperature difference.

QUIZ 4-Q (PART II)

HV&AC Unit D Comp 1 of 1

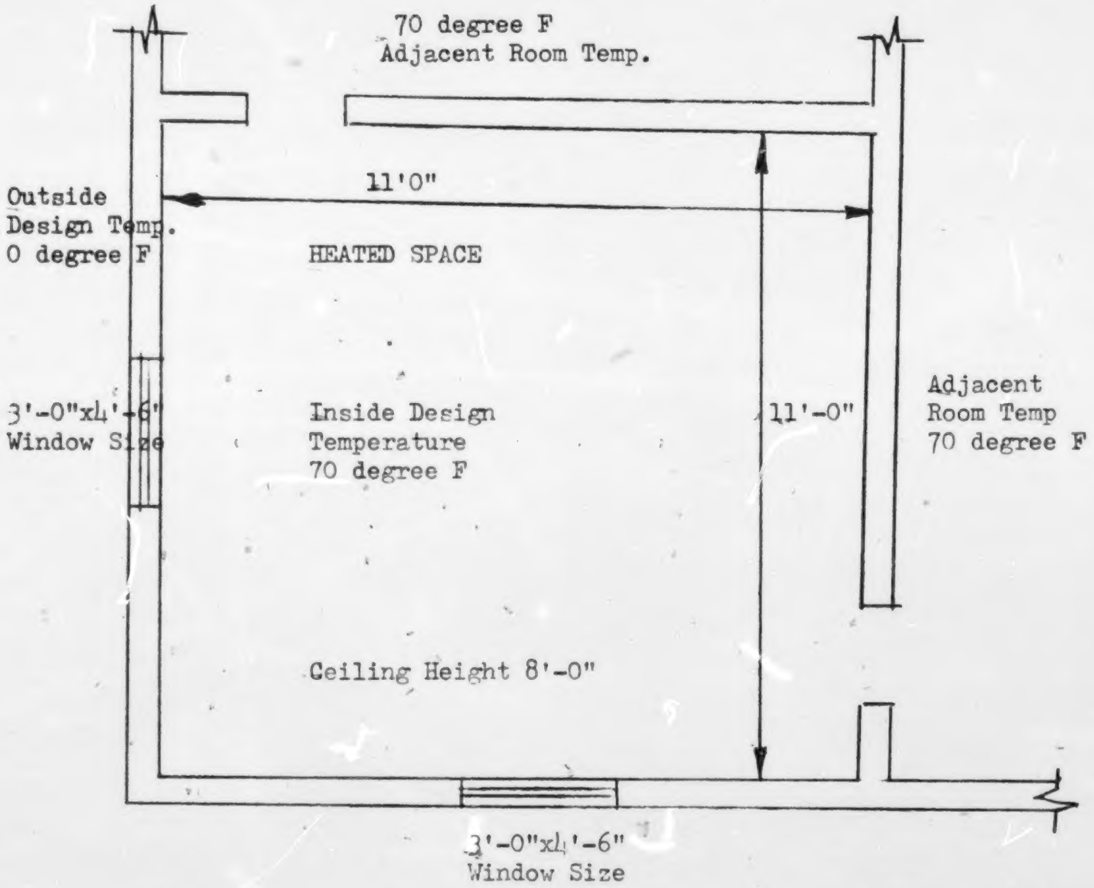
HEAT LOSS CALCULATION

Calculate the total heat loss for the attached problem.

Write your calculations in the blanks below.

1. Gross outside wall area ____________________
2. Window area ______________
3. New wall area ____________
4. Room volume ___________
5. Design temperature difference _______________
6. Conduction heat loss thru window ___________
7. Conduction heat loss thru net wall _______________
8. Heat loss by infiltration __________________
9. Total heat loss _____________________

CALCULATING HEAT LOSS



Design Data

"U" Factors---Outside walls----0.15
Ceiling ----0.08
Glass ----1.13
Infiltration Coefficient--- .018

STUDENT COMPETENCY SHEET

HV&AC Unit E Comp 1 of 1

SPECIALIZATION: Heating Ventilation and Air Conditioning

UNIT: E Duct Systems

COMPETENCY STATEMENT: Demonstrate an understanding of basic duct systems.

PERFORMANCE OBJECTIVE: Given a list of basic duct systems the student will be able to sketch a freehand example of each using no reference. the duct systems being:

1. Individual Duct System 2. Trunk Duct System
3. Perimeter Loop System

LEARNING ACTIVITIES

1. Read section on warm air pages 232 and 233 "Architectural Drafting and Design".
2. Study Fig. 1 page 232 individual duct system and draw a freehand sketch. Notice the plenum box on top of the unit.
3. Study Fig. 2 page 233 trunk duct system - draw a freehand sketch. Notice that the trunk duct gets smaller after each branch is dropped off.
4. Study Fig. 4 page 233 perimeter loop system. Notice that a duct loops the perimeter.
5. Complete attached Quiz 5-Q. Have your teacher grade & discuss.
6. If a min. score of 85% is not achieved, restudy and retake exam.

STUDENT COMPETENCY SHEET (CON'T)

HV&AC Unit E Comp 1 of 1

UNIT: E Duct Systems

EVALUATION

Given a list of basic duct systems the student will be able to sketch a freehand example of each using no reference, the duct systems being: 1. Individual Duct System 2. Trunk Duct System 3. Perimeter Loop System.

QUIZ 5-Q

HV&AC Unit E Comp 1 of 1

DUCT SYSTEMS

Sketch freehand an isometric of the following duct systems.

1. Individual Duct System

2. Trunk Duct System

3. Perimeter Loop System

STUDENT COMPETENCY SHEET

HV&AC Unit F Comp 1 of 1

SPECIALIZATION: Heating Ventilation and Air Conditioning

UNIT: F Heat Piping Systems

COMPETENCY STATEMENT: Demonstrates a knowledge of heat piping systems.

PERFORMANCE OBJECTIVE: Given a list of heat piping systems draw a freehand sketch of the following piping systems using no reference.

a. Series loop system w/boiler, expansion tank, and 4 baseboard units.

b. One-pipe system w/boiler, expansion tank, and 4 baseboard units.

c. Two-pipe direct return system w/boiler, expansion tank, and 4 baseboard units.

d. Two-pipe reverse return system w/boiler, expansion tank, and 4 baseboard units.

LEARNING ACTIVITIES

1. Read pages 233 thru 235 "Architectural Drafting and Design", and study figures 7, 8, 9, & 10 pages 234 and 235.
2. Listen to lecture
3. Draw a series loop system w/boiler expansion tank and 4 baseboard units in isometric.
4. Draw a one-pipe system w/boiler, expansion tank, and 4 base board units in isometric.
5. Draw a two-pipe direct return system w/boiler, expansion tank, and 4 baseboard units in isometric.

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6. Draw a two-pipe reverse return system w/boiler, expansion tank, and 4 baseboard units in isometric.
7. Study 1, 3, 4, 5, 6, 7, and 8
8. Acquire Quiz 6-Q from teacher and complete
9. If score is less than 85% repeat learning activities 1 & 2 thru 8 then acquire another exam from teacher.

EVALUATIONS

Given a list of heat piping systems draw a freehand sketch of the following piping systems using no reference.

a. Series loop system w/boiler expansion tank and 4 baseboard units.
b. One-pipe system w/boiler, expansion tank, and 4 baseboard units
c. Two-pipe direct return system w/boiler, expansion tank, and 4 baseboard units.
d. Two-pipe reverse return system w/boiler, expansion tank, and 4 baseboard units.

QUIZ 6-Q

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HEAT PIPING SYSTEMS

Draw a freehand isometric of the following heat piping systems indicating the boiler, compression tank, and 4 baseboard units.

1. Series Loop System-

2. One-Pipe System-

3. Two-Pipe Direct Return

4. Two-Pipe Reverse Return

STUDENT COMPETENCY SHEET

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SPECIALIZATION: Heating Ventilation and Air Conditioning

UNIT: G Duct Fittings & Layout

COMPETENCY STATEMENT: Demonstrates knowledge of common duct fitting & layout.

PERFORMANCE OBJECTIVE: Given a one line diagram of a forced air duct system, draw the duct system to scale, giving all dimensions. Use "Typical Duct standard connections", prescribed in attached handout.

LEARNING ACTIVITIES

1. Listen to lecture by teacher
2. Redraw per instructions attached handout
3. Complete attached one-line duct layout problem per instructions
4. A minimum grade of 85% must be achieved, if not acquire another layout from teacher and draw.

EVALUATION

Given a one line diagram of a forced air duct system, draw the duct system to scale giving all dimensions. Use "Typical Duct connections" prescribed in attached handout.

INSTRUCTIONS FOR DRAWINGS 1 & 2

Using attached handout entitled "Typical Duct Connections" redraw the duct fittings illustrated using a scale of ½"=1'-0" on 9 x 12 vellum. Before you begin drawing, read the following descriptions of duct fittings and accessories.

1. Duct Liner (insulation) - Insulation added to the inside or sometimes to the outside of the sheetmetal. The purpose of adding insulation is to: 1. Retard heat loss and 2. To control noise produced by the moving air.
2. Air Turns-Turning vanes placed in elbow duct fittings to direct the air as a result deadening the sound somewhat. Air Turns can be draw freehand.
3. Air Extractor-A device placed at the intersection of trunk ducts and branch ducts to extract the air, and aid in the "balancing" of the system. Air Extractors can be drawn by careful estimation with the arcs being drawn freehand.
4. Volume Damper-Device placed in a branch duct to control CFM of air to that branch. The size of volume dampers is represented by a symbol as indicated in unit B.
5. Splitter Damper-A device placed at the connection point between two ducts and a third duct used to control the amount of CFM going to each of the two smaller ducts.

TYPES OF FITTINGS (Rectangular Duct)

6. Square Elbow-Notice the square elbow in this case has air turns installed. Air turns are not always used but the use of air turns provides a quieter system.

7. Round Elbow-Notice that the round elbow dows not use air turns-The curvature of Round Elbow provides a gradual turning of the air thereby minimumizing air flow noise.
8. Reductions or Size Transitions-This example indicates a size transition in a straight run of duct. Sometimes transitions are made in elbows or other fittings. It is best to make a size transition in a straight run.
9. Square/Round Transitions-Sometimes it is required to use both round and rectangular duct for the same system requiring in some instance a transition from round to rectangular or rectangular to round. A case of such would be a situation of limited space. A flat rectangular duct might fit where a round duct would not fit.
10. Splitter Damper-In this type of arrangement two ducts stem off a larger duct—In this case the CFM of air flowing thru the 12" x 6" duct is split into two 6" x 6" ducts. Notice the air turns.
11. Branch Duct Connections-Air extractors are used to divert the air from the trunk duct to the branch duct. Some types of air extractors are fixed (not adjustable) and some types are ajustable in which case they are used to balance the system.
12. Now begin your drawing where dimensions are not given, you may scale the example or carefully estimate the size.

After completing drawing number 1 proceed to drawing number 2.

13. Drawing No. 2-Applying situations of duct fittings described in drawing 1. Draw a duct layout of the following sketch using the following 4 steps as a guide.

SPECIAL NOTE - This problem is set up only as a drawing exercise and only includes the supply duct layout.

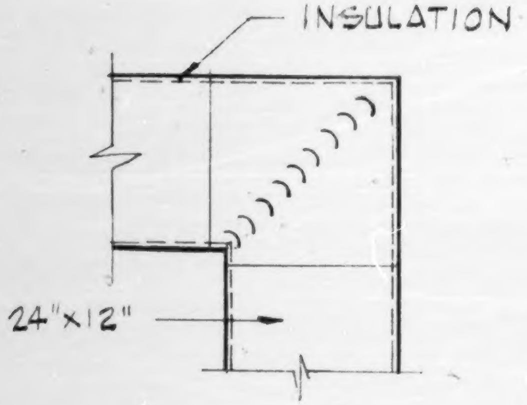
Step 1 - Trace Floor plan on 9 x 12 vellum using 4H lead. A drawing in this form is called a "Dummy" or a "Blank"

Step 2 - Using a scale of 1/8"=1'-0" locate 18" x 18" diffusers in each room as indicated. In rooms with single diffusers simply "X" the area to find the center. In rooms where there are two diffusers divide the room into two equal parts and "X" each part. The center of each "X" will locate the two diffusers. Ask your instructor to help you in locating the 12" x 12" corridor diffusers with 8" x 8" connections.

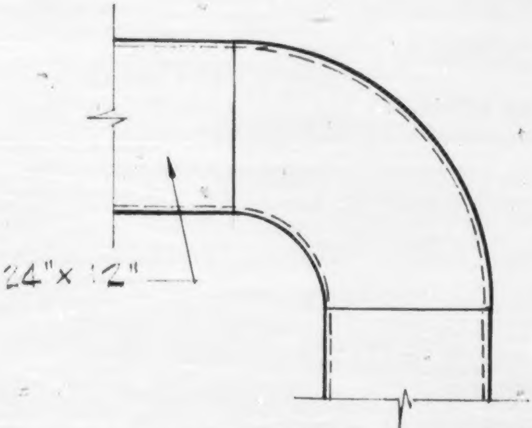
Step 3 - Starting at smallest end of each zone draw the ducts using Drawing No. 1 as a guide. You will also need to refer to Unit B for appropriate duct symbols. Remember the first number given in a dimension is the number you draw. For example if a duct is listed as 12" x 6" on a floor plan the 12" dimension is drawn. Use "rectangular" 90° elbows with turning vanes at corners of duct layout.

Step 4 - Apply dimensions-To make it easier you may look at some other examples of duct layouts. Insulation can be noted as 1" insulation. It need not be shown on plan.

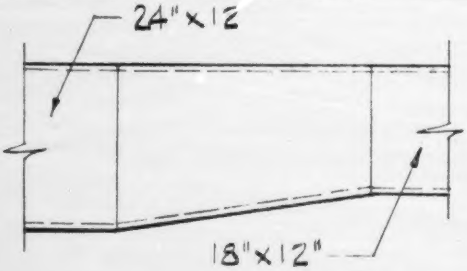
HANDOUT TYPICAL DUCT CONNECTIONS



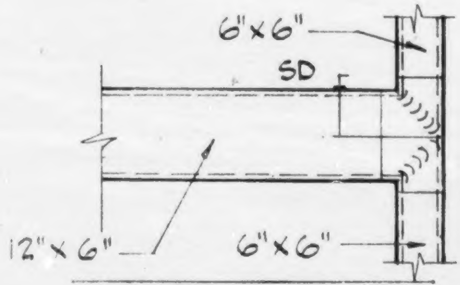
90° ELBOW (RECTANGULAR)



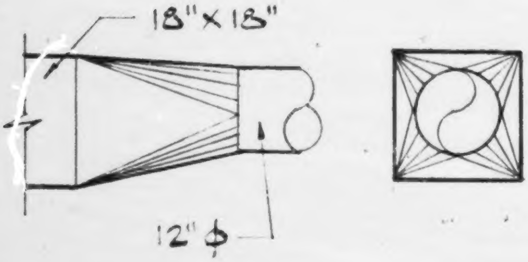
90° ELBOW (ROUNDED)



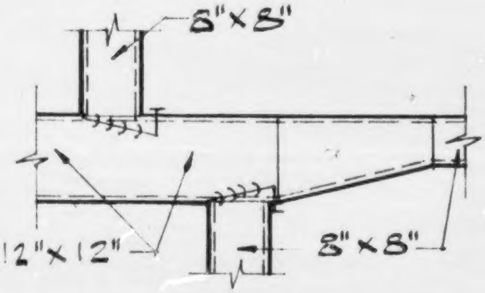
REDUCTION



SPLITTER DAMPER



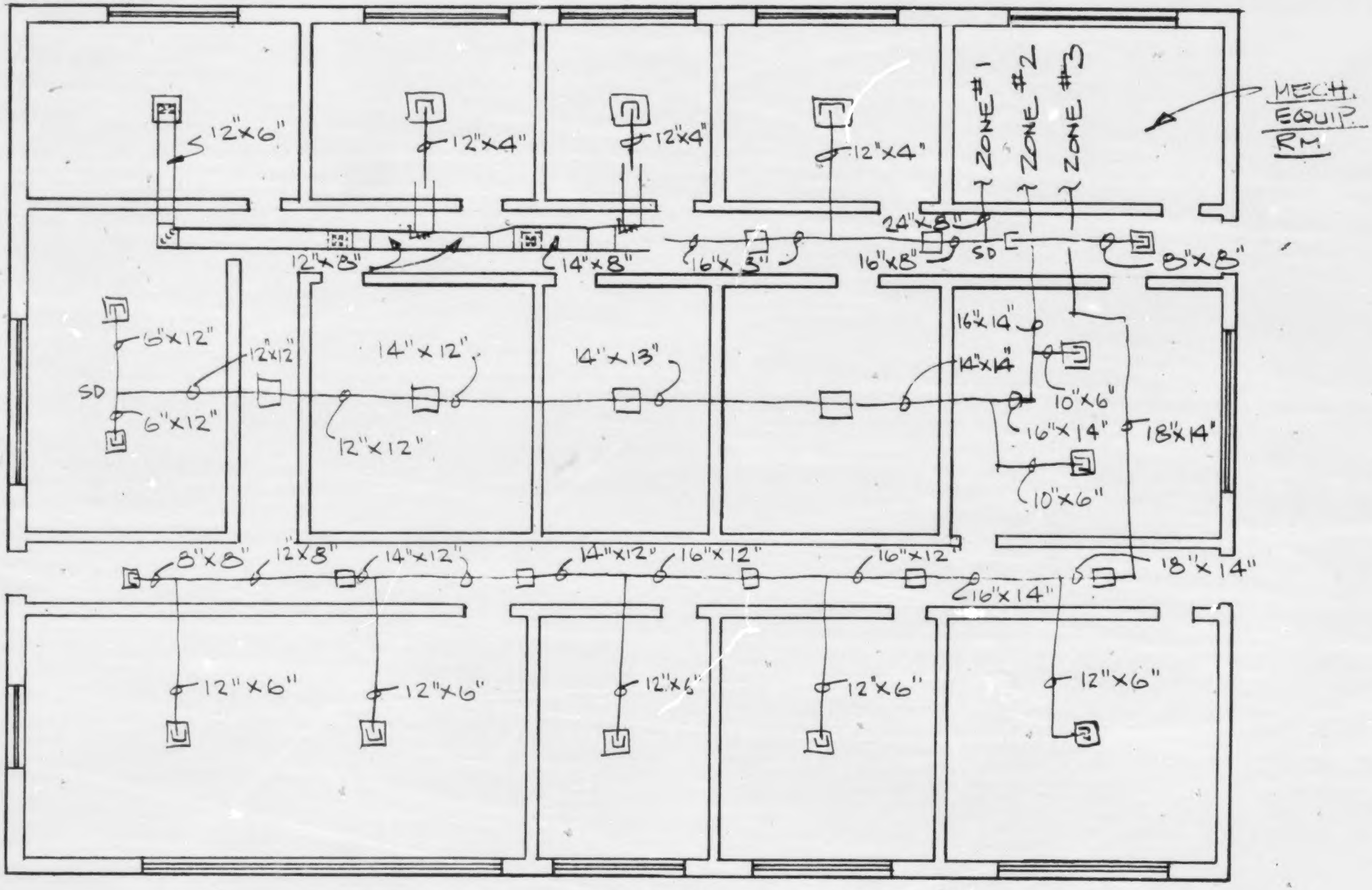
SQ/ROUND TRANSITION



BRANCH DUCT

TYPICAL DUCT CONNECTIONS

DWG № 1
SCALE - 1/2"=1'-0"



FLOOR PLAN - SCALE 1/8" = 1'-0"

DWG No 2

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